Present Prosperous Period Probably Permanent

THERE are always some men who are as timorous of prosperity as they are pessimistic in adversity.

You approach them, saying, "Business is good, isn't it?" And they at once pull a frown and reply, "Oh, I'm not so sure; I'm afraid of this prosperity."

"Afraid of it! Afraid of prosperity." What is it they are afraid of? Fear makes its best recruits from among the ignorant. When a man "don't know," he is afraid.

It is not the dark that a child fears; it is the things he doesn't know in the dark which scare him.

But how a twentieth century business man can proclaim to the world that he "don't know" the rules of the business game, passes our understanding! Why a business man will label himself an ignorant participant in the industrial battle is little short of blind stupidity, especially so when, from any one of a dozen different sources, he may obtain prime information, absolutely reliable, showing just how and why the present period of prosperity arrived and how long it will tarry, and what the signs of its departure will be.

In no nation on earth is there so generally diffused at no expense to the business man, so much splendid information covering the course of the markets, showing the reasons why they advance or decline; the situation as to labor, raw materials, finance, transportation, fuel and power, and every other factor that has any influence upon the general balance of business in all lines.

The Government issues weekly commerce and export reports. They can be had direct or through the daily press. Economic service reports are available from Harvard College, Babson's, National City and other banks, all of them giving in boiled-down terseness the up-to-the-minute business condition in the U. S. and the world for up-to-date business men —men who read and think—don't carp and croak. Croakers hurt themselves and help nobody.

We used to have a heap more of them formerly than we do now. They are a brand of ignorant fatalists, who would never agree that the sun was shining, even though they were basking in its rays. And today we have numerous members of this same gentry who, while reaping good profits from a returned prosperity, still yap away every day about things becoming worse and "worser."

George Prentiss of the Louisville Courier said in days gone by, speaking of a certain citizen who was always rising to inform the people of the United States that things were not as they seemed in this country and that we were headed for dark, dank, drab ruin—that the man in question appeared to him socially to be a very kindly old gentleman, but that economically and politically he was an Amsterdam, Rotterdam, Gotterdam fool.

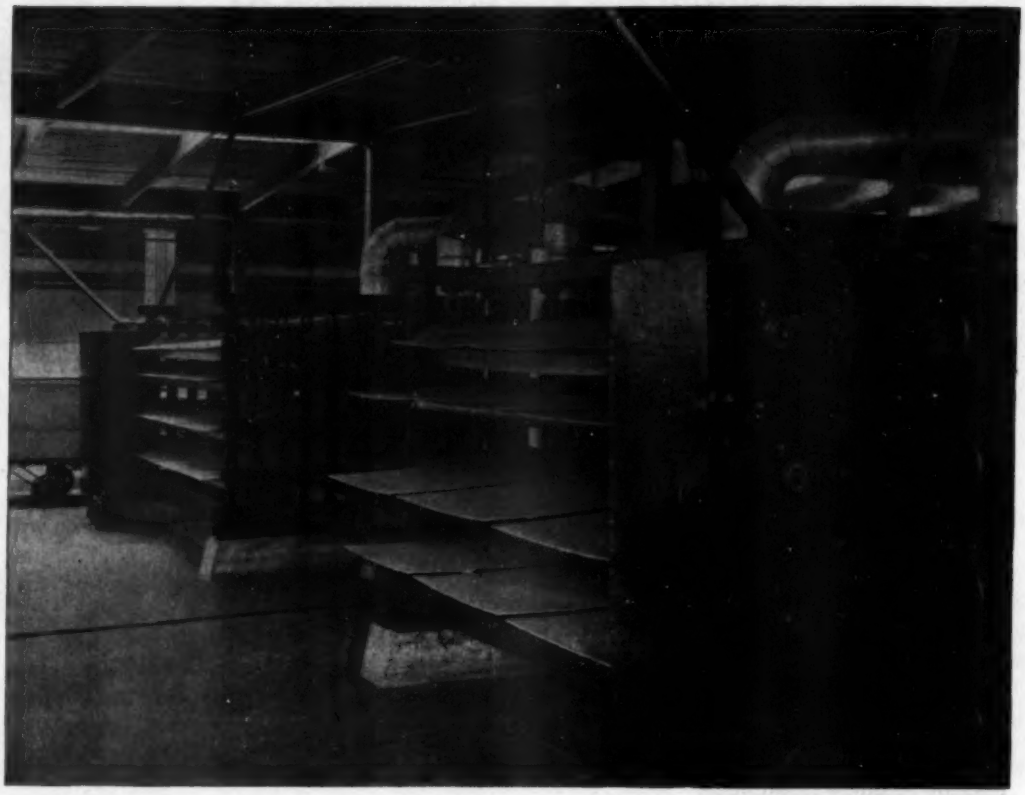
So we say, "That beats the Dutch!"

When you see a fact, admit it!

If you can't see it, look it up and study it out.

Prosperity has returned. It is here, and what's more this present period of prosperity will probably be permanent. If you disagree with this statement, don't croak, but inquire.

The statement is susceptible of proof on basis of the hypothesis that it is the most reasonable and probable course of events.



MANY engineers have remarked that paper is one of the few products that is being dried today by the same methods, (steam heated dryers in an open room) that it was fifty years ago. We have developed a new principle, entirely by high temperature air circulation in an enclosed insulated dryer, which is cheaper and more efficient than a paper machine for heavy work.

Far superior to any tunnel kiln for continuous rapid drying of flat, uniform, smooth sheets and we offer machines for the following products:

COMPOSITION BOARD	FIBRE BOARD
FIBRE WALL BOARD	LEATHER BOARD
PLASTER WALL BOARD	INSULATION
BINDERS BOARD	PULP

We will also build special dryers for new products of wet machines or presses, and we have a dryer at our plant for demonstration or test purposes.

ESTIMATES ON ANY CAPACITY—50 to 1000 Feet Long

THE COE MANUFACTURING COMPANY

PAINESVILLE, OHIO

Western Representative
H. R. MASTERS
549 W. Washington Blvd.
Chicago, Ill.

Eastern Representative
J. O. ROSS ENG. CORP'N
30 East 42nd St,
New York City

EDITORIALS

Already a Success

THOSE in charge of the Superintendents' Springfield Convention which will be held the last day of this month and June 1 and 2, are planning to make it the three biggest days in which the paper mill superintendents of this country have ever taken part.

Consistent with the policy of the American Pulp and Paper Mill Superintendents' Association, a large portion of the program will be given over to the presentation (by experts) and the general discussion of vital paper mill subjects. There has been a well balanced educational program arranged. It is also obvious that amusements will not be lacking.

A convention of this nature is the inspiration of many noble and helpful thoughts. Even the anticipation thereof has its reward in this respect. One of the thoughts which hold a special appeal for us at this time is the thought that every man who attends this meeting will derive out of the meeting only what he goes there to find. If the motive which brings him to this gathering is to learn more and better ways to make paper and to mingle with his fellow superintendents for the betterment of all, he will be rewarded accordingly. If his motive is purely (with no emphasis on the "pure") to have a good time at any cost, he will undoubtedly have his "good time" but not very much of anything else.

The success of a convention of this nature does not depend altogether on the numbers that attend nor upon the excellency of the program, but on the motive which brings the convention about and attracts the members from all parts of the country. In this respect we feel that the Springfield convention is already successful.

King Tut Used Stone

RIGHT at this time when the world is looking back a few thousand years and is giving a good deal of attention to the days of King Tut, an article written by Samuel Hopkins Adams in the current issue of Collier's Weekly is indeed apropos. In this article Mr. Hopkins looks forward some three thousand years to the time when "Americanologists" will be discovering the great libraries of today and the records of today's history.

The burden of this very interesting article is the fact that the stock on which all the big newspapers is printed today possesses no quality of endurance. In but a few years it crumbles back to an inferior saw dust. The paper on which the early history of our country was printed was made of rags and today is preserved in a better condition than early accounts of the World War.

Newspapers are urged to print at least a limited number of each of their issues on a paper that will not return to dust in but a few short years. One paper has adopted the policy of covering record copies with a transparent vegetable tissue which does not seem as practical, however, as that of the London Times, which has for a short time been printing a part of their edition on paper of enduring quality.

S. L. Willson Made President

OUT of the many rumors that have been current for weeks following the resignation of George A. Galliver and Raymond R. Campbell, president and vice-president respectively of the American Writing Paper Company comes the authoritative statement that Mr. S. L. Willson, formerly general manager of the company has been elected president.

The General Service Department under the directorship of Mr. Joseph H. Borden is to continue along the same lines as in the past with enlarged opportunities for continuing co-operation and close relationship with the printing industry. A part of this field service, however, has been discontinued, particularly in the localities where it is practically completed.

Mr. Willson assumes the leadership of this large institution as a result of his achievements and outstanding abilities, exemplified both in the paper industry and paper merchandising field, where he has gained the liking and respect of all for his high character and integrity.

THE PAPER INDUSTRY joins in expressing congratulations.

THERE'S AT LEAST ONE IN OUR OFFICE

(With a bow to Briggs.)

Peter ambles in each morning, talking as he walks:
Seats himself and talks and talks and talks and talks and talks.

Thumb in vest, he jabbers on, of these and those and that;
Talks to us and to himself, the ceiling and his hat.

Nothing in the world escapes his weary dissertations;
Subjects by the thousand get their due expatiations.

Hydrostatics, mathematics, tires, tar and toggle hooks;
Aviation, navigation, gasoline and goggle-books.

Peter isn't like the brook that babbles on forever.
Brooks, perhaps, run dry in summer: but this baby? Never!

Engineers can dam a stream and stop its noisy movement:
Pete's been damned a million times, but hell, there's no improvement!

—*The Chicago Tribune.*

We are STILL furnishing

FOURDRINIER WIRES

to the Paper Mills which used APPLETON WIRES No. 1, No. 2 and No. 3, shipped 27 years ago this spring

They tell us that

"Appleton Wires Are Good Wires"

in fact the best they have run

Fourdrinier Wires
Cylinder Wires
Washer Wires
Save-All Wires

In Brass and Phosphor Bronze

APPLETON WIRE WORKS

Appleton, Wis., U. S. A.

A Study of the Experimental Manufacture of Condenser Paper

By MERLE B. SHAW and GEORGE W. BICKING
Associate Technologist and Paper Maker Respectively, Bureau of Standards, Washington, D. C.

IT HAS seemed to be almost impossible to obtain a paper of suitable qualities for use in the manufacture of electrical condensers where high voltage is used. The requirements for this paper are so rigid that commercial condenser papers, as now manufactured, are not satisfactory. The chief difficulty, at the present time, in the production of such paper by paper mills in this country, making light weight papers, is the fact that their equipment is not sufficiently free from dirt. Such dirt or specks of an electrically conducting nature are extremely detrimental in paper for this use. Commercial condenser paper may be obtained of the required thickness, .0005 inch, but contains conducting particles to the extent of thirty or forty to the square foot.

There would probably be a large increased manufacture and use of such condensers if a suitable paper were available in commercial quantities. In order to determine whether such a paper could be made and to investigate the factors entering into its production, a study was made with the experimental paper making equipment of this bureau. It was thought possible to determine a procedure for making this paper which would assist paper mills interested to improve the quality of this product.

The experimental paper-making equipment available for this work consisted of a 50-pound wood tub beater with iron bars and plate; a 300-pound concrete, tile-lined beater with phosphor-bronze bars and plate; a 4-plate screen, and a 29-inch Fourdrinier machine with wire 33 feet long, having two presses, nine 15-inch dryers, a small machine stock of 7 rolls, a reel and a 9-roll Holyoke supercalender stack.

Use of Condenser Paper*

Electrostatic condensers have many uses for both direct and alternating currents. On direct current circuits they are generally placed around contacts which must make and break a circuit frequently, as sparking and consequent wearing of the contact may be considerably reduced by their use. An example of such use of condensers is found in ignition systems of gasoline engines. The use of condensers on alternating current circuits may be roughly classed as condensers for use in power circuits, condensers for use in telephone circuits, and condensers for use in radio circuits.

*This was written by H. L. Curtis, Chief of Section on Inductance and Capacity.

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Requirements*

The requirements of condensers for these three classes of use are frequently quite different. For instance, power condensers must be able to withstand high voltages, whereas for telephone work the voltage applied is very low. In the construction of all of the above classes of condensers, paper is one of the most common insulating materials which is used. Mica, glass, air and oil are all used in condensers for special purposes, but in almost all of the above classes the great majority of condensers are made from paper. While the total consumption of paper is not large, yet it is a very important factor in the electrical industry. In selecting paper to be used in condensers, attention must be given to the uses to which the condenser is to be put. There are, however, certain general requirements. The paper must be thin, of a uniform texture, free from holes and other imperfections.

Construction of Paper Condenser*

A number of processes have been used in the manufacture of paper condensers. In all of these processes at least two sheets of paper are used between the metallic plates, for in so doing any metallic particles or other imperfections in one sheet of paper will not be likely to coincide with an imperfection in the other piece of paper.

For high voltage condensers it is necessary to have an appreciable thickness of paper. If a thickness of paper of .02 inch was required, instead of using paper of this thickness there would be used ten sheets, having a total thickness of .02 inch. In this way the imperfections of one sheet will be of less importance.

One method which is used in making condensers is as follows: The paper is cut to the desired size. A certain number of these sheets are counted out. A sheet of tinfoil which is somewhat smaller is laid on these sheets so placed that there is a margin of approximately one-half inch all around the paper, excepting at one point where an ear attached to the tinfoil projects beyond the paper. Then the same number of sheets of paper are counted out and laid on top of this tinfoil. A second sheet of tinfoil is then placed on this paper, the difference being that the ear projects from the paper at a different point. Another set of sheets of paper are counted out and the third sheet of tinfoil laid on top, coinciding with the first, and so on until a condenser of the desired size has been assembled.

The assembled condenser is then placed in a closed

vacuum tank from which the air can be exhausted. It is maintained at a temperature of about 100° C. for a number of hours, until the water vapor is thoroughly driven out of the paper.

Water free oil is then allowed to enter the lower part of the chamber until it touches the paper where it is allowed to stand so that capillary action will draw the oil through the paper. When oil appears at the top of the condenser, the oil in the vacuum chamber is raised so as to immerse the entire condenser. The condenser is then placed in metallic cans and sealed.

This investigation was concerned with making paper for power condensers for use on high voltages. In such condensers it is extremely important that the metallic particles be eliminated from the paper, since not only do these particles decrease the effective thickness of the paper, but an electric discharge may form around the metallic particles which will cause a slow charring of the paper around the particles which eventually will produce a breakdown in the condenser. This investigation was undertaken to see to what extent metallic particles could be eliminated from paper.

Co-operative Assistance

The General Electric Company (Pittsfield Works Laboratory) and The Smith Paper Company were specially interested in this problem and were of great assistance in working out some of the details and in the loan of certain equipment and supplies. Representatives of the two companies were present during a number of the runs. A beater roll of special construction and extensions for a pick-up felt attachment were obtained through the assistance of the General Electric Company, while the Smith Paper Company had made and sent to the bureau a lower couch roll of special design. The necessary raw materials were supplied by the General Electric Company. A supply of the finished paper was submitted to the General Electric Company and was to have been used for building up several experimental condensers.

Experimental Procedure

The raw material used in this work was white cotton shirt cuttings and white linen clippings, used separately, not in combination.

Three runs of paper were made using all new white cotton shirt cuttings as raw material. The process of preparing the rags for the beater was as follows: The rags were sorted by hand and passed over half-inch mesh wire screen to remove dust and metals. (It might be interesting to note that in hand sorting the following articles were found in a 600-pound bale —2 nails, 2 needles, 3 pins, 1 knife blade and 1 piece of steel.) The rags after being sorted were passed through a rag cutter and were then dusted again to insure freedom from small bits of metal which might have come from the cutter knives or have been overlooked in sorting. The rags were not cooked, but used raw. They were washed in the first part of beating in every case.

In all this work on condenser paper, a 90-mesh wire was used on the paper machine.

50-Pound Beater with Iron Bars and Plate

The beater first used was a 50-pound wood tub beater with iron bars and bed plate.

In the first beater (a) the stock was beaten 27 hours with the beater roll grinding slightly on the bed plate. In running the stock over the paper machine a poorly formed sheet was made, due to the formation of air bubbles between the wet felt and the web of the paper. This condition was overcome in the following runs by using a steam suction box against the felt. The paper was .0012 inch thick and had 2 conducting particles per square foot.

In the second beater (b) the stock was beaten 29 hours with the beater roll barely touching the bed plate. This run gave a well formed sheet of paper .0008 to .0010 inch thick and showing but 1 conducting particle per square foot.

In the third beater (c) the stock was beaten 63 hours with the beater roll just above the bed plate. This run gave a poorly formed sheet, full of pin holes due to the long fibers remaining after light beating.

The conclusions drawn from the preceding runs were: First, metal free paper cannot be made when using iron bars and bed plate and the beater roll touches the bed plate. Second, a good sheet of paper cannot be made unless the roll touches the bed plate.

300-Pound Concrete, Tile-Lined Beater with Phosphor-Bronze Bars and Plate

There was next tried the 300-pound concrete tile-lined beater, having phosphor-bronze bars and plate. The reason for using phosphor-bronze was that 40 per cent longer life is claimed for this metal than the iron because of less wear on the metal bars. It was thought this would give less metal conducting particles. The roll in this run was just touching the bed plate. The paper was .0009 to .0013 inch thick and tested 12 conducting particles per square foot. Under the microscope these particles proved to be bronze.

The conclusion to be drawn from this run and those preceding is that metal-free condenser paper cannot be made satisfactorily using a beater equipped with metal bars and bed plate in preparing the stock.

"Stone" Roll and Plate

The "Stone" roll and plate used in the following runs were made of cement and small quartz particles by Mr. Beecher of the Diamond States Fiber Company for our 50-pound wood tub beater.

Three runs were made using the stone roll and plate before the correct method of handling beating was

found. The first two trials were made by lowering the roll onto the stock gradually and resulted in a very "slow" stock, which was hard to handle on the paper machine because of the difficulty in removing the water. At the beginning of the beating the stock would hardly circulate, but after building up backfall and having it closer to the roll, circulation was good.

The third trial was made by lowering the roll onto the stock at the beginning, grinding as hard as the power would permit. As the stock was beaten, the roll was eased off. The time consumer in preparing the stock with the stone roll and plate was from 9 to 18 hours. The conducting particles in this paper averaged about one in every three square feet examined.

Several runs were made using half-stock prepared by the Smith Paper Company, using the stone roll and plate in the 50-pound beater. During some of the runs a pick-up felt attachment was used on the paper machine, but it did not give satisfactory results. It was claimed by the representative of The Smith Paper Company, who was present during the tests, that this was due to the felt. He claimed that with the proper kind of felt and a grooved lower couch roll that it would work satisfactorily.

The paper made from the half-stock was .001 inch thick and contained 6 to 12 conducting particles per square foot. The increase in the number of conducting particles was thought to be due to the method of preparing the half-stock, because when using raw rags and the stone roll the paper had an average of only one conducting particle in every three square feet examined.

Testing Method

One method used in testing thin paper for conducting particles is described, and a cut of which is given, in Paper Trade Journal, Volume 75, Number 5, page 49, August 3, 1922. In testing papers† .003 inch and under in thickness, a brass plate about 12 inches by 10 inches in area and a brass roller with a handle is used.

The plate and roller are very smooth and polished to insure perfect contact. They are connected with 100 volt D. C., with resistance in series to prevent pitting of the plate and also with a pair of telephone receivers in series so that when contact is made between the roller and plate a click is heard in the receivers. The paper to be tested is placed on the plate and by passing the roller over a given area of it the number of clicks received in the receivers may be counted and the number of conducting particles per square foot estimated.

In testing for conducting particles in thicker paper a special made machine for this purpose is used. The paper is passed between a brass plate and a series of brass rollers having a two inch face with potential applied to both plate and rollers at the rate of 100 volts for each .001 inch in thickness of the paper. For example a .010 inch thick paper is treated at 1000 volts. The rollers are in two rows and staggered so that the entire surface of the paper is tested. The paper is run through the machine slowly and a man is stationed at the machine to mark each break by drawing a circle around it with a crayon.

Recommendations

These recommendations are based on above experiments and it is believed that a suitable paper may be made in this manner. Cleanliness of the stock and the whole system cannot be emphasized too much.

Stock: New cotton and linen cuttings, carefully cut and dusted should be used raw in the beater. In cutting and dusting a self-cleaning magnet roll to remove metal and conducting particles from the cut rags could be used to advantage.

Water: Filtered water should be used. Pipes handling the filtered water should be made of a non-corroding material.

Pumps: Pumps handling the stock and water should be made of a non-corroding material.

Beater: The beater should have a stone or cement and quartz roll and plate.

In the sand trap there should be a self-cleaning magnet roll ‡ to serve as a last precaution before the stock goes onto the machine.

If a Fourdrinier machine is used the wire should not be coarser than 90 mesh and a pick-up felt around the upper couch roll is desirable. If a cylinder machine is used care must be taken to obtain a well-formed sheet free from pin holes.

A super-calender stack may be necessary in order to reduce the thickness and to give denseness to the paper.

The Care of the Wire

BY A PAPER MAKER

THERE are other factors besides the manner in which the wire is fastened in the framework of the suction box and the lining or jacketing of the same that are of vital importance in the care of the wire. A number of these factors are discussed below and their importance to the paper making is emphasized.

In the first place, the suction effect should not be applied to a surface of too small area, but it should rather be spread over a large surface area, so that the force of suction to which the wire is subjected is not too great. It is for this reason that the construction of the suction box must be suited to the speed at which the paper making machine works and to the quantity of paper that is produced on it within a certain definite period of time. This circumstance must be taken in consideration when the paper mak-

†Data received from Amos L. Allen, Pittsfield Works Laboratory, General Electric Company, Pittsfield, Mass., U. S. A.

‡Self-cleaning magnet rolls are manufactured by P. J. Doyle & Company, 103 Nursery Street, Springfield, Mass.

ing machine is being built and it is the duty of the builder to bear this in mind.

If for any reason, due to carelessness or poor designing experience, the suction arrangement in any paper making machine is not suited either to the speed at which the wire travels or the quantity of paper produced within a definite time, if, for example, the suction arrangement is too small, then the condition arises that the paper making machine produces paper of entirely different quality or weight than what was originally intended it should make. A paper making machine, which produces a paper web two meters wide, when it is to operate constantly for a prolonged period of time and make regularly 500 to 600 kilograms of paper per hour, that is to say, all sorts of papers, thin and thick, fine and ordinary. In order to accomplish this, the machine must be provided with at least four suction boxes.

It is of course clear that when the paper making machine is furnished with the proper and sufficient number of suction boxes, the wire is not subjected to so severe a strain and consequently the wear and tear on it is much less than when the paper making machine is constructed with an insufficient number of suction boxes, for example, with just two instead of four boxes. It is evident that in the latter case, when there are four boxes under the wire, the pull on the wire is not so great as when the machine is only provided with two suction boxes. In this connection the writer wishes to call attention to the fact that the suction in the suction boxes is very often altogether too strong. In certain cases where the paper making machine was constructed with four or five suction boxes, the suction in the first two or three boxes was so strong and so much water was removed thereby that scarcely any water at all came through in the last two boxes in the series. In spite of this fact the suction on these last two boxes was so great that it was productive of considerable injury to the wire and to the lining or casing of the box itself. But this is not the only respect in which too great suction in the suction boxes is of detriment to the paper making machine and the paper making process. For when the suction is too high, very fine particles of the paper stock are torn out of the paper web by sheer force and the result is that the quality of the paper product is impaired to quite a considerable degree.

It is not at all a new development in paper making practice that when the paper stock is warmed up, the dehydration of the same is facilitated very considerably. This is especially true when treating slow stuff or when manufacturing thick papers. Nevertheless, the paper stock should not be heated up too much; it should only be lukewarm, as when it becomes hot the sizing in the paper stock is injured by the excess heat.

We must pay some attention to the moving suction box, an arrangement which has been patented and which has been described in various publications. This type of suction box has been introduced in various paper mills. The question arises, what effect has this new type of suction box on the wire? Does it increase or decrease the wear and tear on the wire? There is hardly any question that the use of these new, moving suction boxes has a great effect on the care of the wire. In the first place, the wire is not held so tightly by the boxes, but it moves over the same easily and unhesitatingly. The wire is guided more easily by the use of them and, furthermore, it runs much faster.

The Lining of the Suction Box

A few words must be said regarding the lining of the boxes. It has been declared that practically everything possible has been tested out as lining material for suction boxes, but only negative results have been obtained from these experiments. The author himself, a practical paper maker, has carried out many experiments in his long experience in the paper industry. He has experimented with enameled flat iron rods, with glass plates and other materials, and all in vain. Both these materials do not stand up against the strain, but they grind or rub off. Glass breaks and splits at the top. It is not possible to secure a good fit, either.

Up to the present time the best material for this purpose has been wood. In comparison with other materials of construction, wood possesses the advantage of being cheaper, is easily obtainable and can be worked without any difficulty. Before the wood is used in making the box, it should be moistened. The wood is placed in water for a certain length of time, so that after it is made up into the box it does not swell up any more nor does it warp. After the wire is pulled over the top of the suction box, if it appears necessary, the carpenter goes over the surface with a plane and square and trues it up perfectly.

In order to prevent the edges of the wire from cutting into the lining or casing of the suction box, it is advisable to set in metal plates at both ends. These plates may be made of brass or bronze and are about two millimeters thick. The plates are arranged in the length as well so that as the wire travels toward one or the other side the edges of the wire do not fall off the metallic plates. The length of the plates is about 200 millimeters, which is sufficient for this purpose. These metallic plates must be set into the wood so deeply that they are flush with the rest of the upper surface of the suction box. These plates can be removed whenever it is necessary to true up the surface. The plates may be fastened to the wood by simply screwing it down tightly. It is recommended that the plates be fastened to the wood in this manner.

Furthermore, it is also correct, as has been stated in many published articles, that the couch roll forms one of the most important parts of the paper making machine. Nevertheless, what would be the value of

the couch roll if the paper web is not properly and sufficiently dehydrated by passing over the suction boxes? When the paper sheet comes on the couch roll in a too wet condition, good, efficiency couching, efficient pressing and as a result thereof correct working of the paper making process cannot be obtained. There are paper making machines, principally those machines of older construction, in which the suction arrangement does not bear the proper relation to the drying apparatus, whereat in making many different kinds of paper the machine can operate faster, due to the drying part of the same possessing larger capacity than the suction arrangement permits.

It may be held to be true, all things being considered, that an efficient, sufficiently large suction arrangement in accordance with existing conditions is not only of great influence in reducing the wear and tear on the paper making wire, but is also of great importance on the efficient operation of the paper making machine in its entirety.

From Wochenblatt fuer Papierfabrikation, No. 43, 1922.

Foremen and the Go-Together Spirit

By H. M. GRASSELT

INDUSTRIAL progress and successful modern organization require the closest co-operation of the two principal factors—the capital investor or employer and the labor investor or employee. While experiments in European countries have shown, that autocratic control whether by employers or employees is detrimental to the progress of industrial life, American industries built their enterprises upon co-operation and democratic policies.

Although in large concerns the personal contact between employer and employees has become quite impossible, personnel relation bureaus, superintendents, works managers and foremen act here as intermediaries with great success. In small mills the patriarchal conditions of former years still exist to a certain degree, but here, like in a larger plant, superintendents and formen are the real creators of the "family spirit" and contribute in a large measure to the success or failure of their establishment.

Quite natural, both principal factors—the employer and the employee—wish to obtain the best possible results from their respective investments.

The former expects the greatest return on each dollar of his investment, while the latter looks for lucrative and steady employment, protection of his health and congenial working conditions. To gain these ends, the plant must yield maximum production and a uniform product of high quality. The process of manufacture has to be economical, waste must be eliminated and the cost of the product as low as possible to meet competition successfully.

Co-operation of Vital Importance

Co-operation will produce the desired results. It should be preached continuously, from the head of the organization to the last man in the mill, so that its spirit may penetrate to every corner of the plant and office. The welfare of employer and employee is irrevocably linked together; organization and policies cannot produce their best if the spirit of team work and mutual understanding is missing.

Co-operation has been called the golden rule of organization. To be successful, departments and individuals as well must work together in every way with the precision of clock work. Every workman, no matter how obscure his position, should realize, that he is part of the enterprise and dependent on its welfare. No matter how small or how large a plant, antagonism, petty jealousy and personal dislikes should find no place within its organization.

Men in executive positions, as foremen and superintendents are the men to instill in the individual the ideals of team work. They should consider it part of their duties, to acquaint their help with the elementary principles of organization and industry. Why not explain to them the aims and policies of the administration and thus promote effective team work? Why not tell the help of some difficulties that may arise in the manufacture and finishing of the product? Why not give them an idea of the many worries a "boss" has to carry around with him, so that they come to realize that the life of the "men higher up" is far from being easy and carefree?

Good team work will inevitably bring forth efficiency and the results will be higher production, a better product and a well satisfied organization.

Naturally, every wage earner expects the greatest possible money returns for his efforts, but money alone does not make an efficient and loyal worker. He likes to know that his co-operation is desired and his ability appreciated. A steady job and a comparatively secure future mean a good deal to the worker, particularly to the married man. The threat of being "laid off" deteriorates the efficiency of employees and robs them of their ambition.

The Foreman's Part

Since the foreman is the recognized leader of his department and the representative of the administration within his sphere of action, his influence and his aptitude will be shown by the members of his department. If his policy is one of giving a square deal and going to the limit in helping the other fellow, his department will show corresponding results. If his

policy consists of coercion, "bullying" and "bawling out," his help will be glad to get now and then something "on him." He may, for instance, issue a wrong order, his help may see the mistake, but nevertheless do the work wrong, that is, according to the order and consider it a huge joke on the foreman, while the company, as usual, will have to pay the bill.

In mills, where the foreman is entrusted with the hiring of help, he should give the applicant a clear line on the work he is to do as well prospects of promotion or betterment. He must instruct new men how to do their work in the best possible way and explain to them, what results are desired. In former years a foreman who did not like the work of a member of his force, or disliked the man for one or the other reason, simply "fired" him and thus effectively removed for good and ever the cause of annoyance. Today, the foreman knows that labor turnover is very expensive and considered industrial waste which has to be eliminated or at least reduced to a minimum.

The ordinary man does not make mistakes willfully. Here the power of putting oneself in the place of another, feel as he feels, think as he thinks, will prevent many a "bawling out" and a man-to-man talk will be of greater benefit to all concerned. Helpful criticism is quite as necessary as a compliment on a well done job.

To add to the welfare of his department, the foreman should try, whenever necessary, to improve conditions and equipment and see to it that sanitary conditions are up-to-date, also that lighting, heating and safeguarding of machinery are effective and up to requirements. Upon these factors depends to a very great degree the well-being of the workers and their staying with the concern.

Because of his position, the foreman must thoroughly understand the policies of his concern. He has to be wholly in sympathy with them, otherwise he will not be able to properly interpret them to his help. He should take special pains to carefully explain to his department any innovation which has to do with production or wage questions and which the company is about to adopt.

There is nothing perfect in this world and hence, an ideal harmony between foreman and all men under his charge is something that is very infrequently consummated to the extent of bringing about the millennium within the plant. However, every foreman can accomplish much if he tries to thoroughly understand every man under him.

Only the selfish person is all for himself. Cooperation demands exchange of ideas and experiences. There is no better way of getting acquainted and learning of the other fellow's troubles and get an idea of his department and work, than getting together to discuss these matters. Many mills have found it a good expediency for promoting the spirit of team work and understanding of their policies to organize foremen clubs with semi-monthly or weekly informal meetings. Exchange of data and experience in the field of papermaking and modern organization constitute the subjects of discussion at those meetings. A good way to promote discussions is to assign certain questions to members of the club, to be prepared and talked on at the next meeting.

Furthermore, trade journals should be passed from one foreman to the other, with articles of special interest marked. These magazines ultimately should find their way to the different departments where the help during lunch hours may read these mediums for the interchange of experience and funds of information, and thus become acquainted with the methods of other organizations as well as the trade and its problems.

To-day team work is the great issue and the foreman who has acquired the faculty of promoting it is the man who will find recognition.

Ruths' Steam Accumulator

By PAUL DE GUEHERY

ONE of the newest inventions that I came in contact with on my recent visit to Europe and one that undoubtedly will be of extreme interest to the paper and pulp industry is the steam accumulator invented by the Swedish engineer, Dr. Ruths. While a number of papermakers, who regularly follow the newest developments of the industry here and abroad, have already studied the details, there will probably be many who never had the opportunity to hear anything about that new invention. For their benefit I will make just a few remarks and shall endeavor to outline roughly the principles and efficiency of said steam accumulator.

The purpose of the steam accumulator is, in manufacturing plants with a considerable variation of steam consumption, to promote a constant production of steam, so that at times, when less steam is required in due course of the operation of the plant, the surplus is accumulated, and, vice-versa, this accumulated steam-excess is given off, when the steam consumption is increased.

It is easily conceivable that a boiler-plant without such steam accumulating device must have sufficient capacity to take care of the maximum requirements on steam consumption of the plant, whereas a boiler plant with the addition of a steam accumulator only has to have a capacity sufficient for the average steam consumption.

Dr. Ruths' steam accumulator in fact is a hot-water accumulator, whose physical properties are similar to those of the fireless locomotive, the only difference being that its real purpose is to act like a puffer-battery between the generating and the consuming part of the steam plant, in order to take care of the variations of the latter and allow the former to operate with constant efficiency.

Every boiler can for a time generate more pounds

of steam than would result from the amount of calories produced by the fuel at a given unit simply by reducing its steam pressure and with it releasing a certain amount of its water for the generation of steam. But such variation in the pressure of the steam is not at all desirable and very objectionable wherever power plants are operated in conjunction with other steam consuming units.

The steam accumulator as invented by Dr. Ruths effects really nothing else but a considerable enlargement of the water capacity of a system of boilers; that is to say, of the amount of water available for accumulating and releasing varying amounts of steam by means of increasing and decreasing its temperature and pressure. The steam produced in excess of the amount required for immediate consumption is blown into the water of the accumulator, thus raising its pressure and temperature. When more steam is required than the boilers will generate at a given rate and resultingly the pressure in the steam line sinks, the excess steam, held in the accumulator by means of higher temperature and pressure of its water, is released until the period of increased consumption is over and the process is reversed. This process is automatically regulated by means of reducing valves, which are built in between the accumulator and the steam consuming end of the plant.

It can easily be seen that such steam accumulating system must be of special interest to the paper and pulp industry, where sulphite plants and paper manufacturing plants are combined and where the cooking process in the digesters causes a considerable variation of the requirements on steam, which so far can only be overcome by operating boiler space in excess of the average steam consumption.

It has been found that Dr. Ruths' steam accumulator has in sulphite plants effected as much as 30 per cent saving on the boiler space in operation after its installation, without extra costs for labor, etc., outside of its initial costs of installing. At such a rate the accumulator will have paid for itself in a very few years.

In concluding, it should be mentioned that while the steam accumulator is mostly erected in the open, insulated with asbestos, etc., the loss of temperature and pressure due to variation in the atmosphere is negligibly small.

The Fourdrinier Machine

By HARRY E. WESTON
Instructor in Pulp and Paper Manufacture, The New York State College of Forestry, Syracuse, N. Y.

This is the sixth installment of the article on the Fourdrinier machine in preparation by the author. Further installments will appear in succeeding issues.
—Editor.

Drive Arrangement

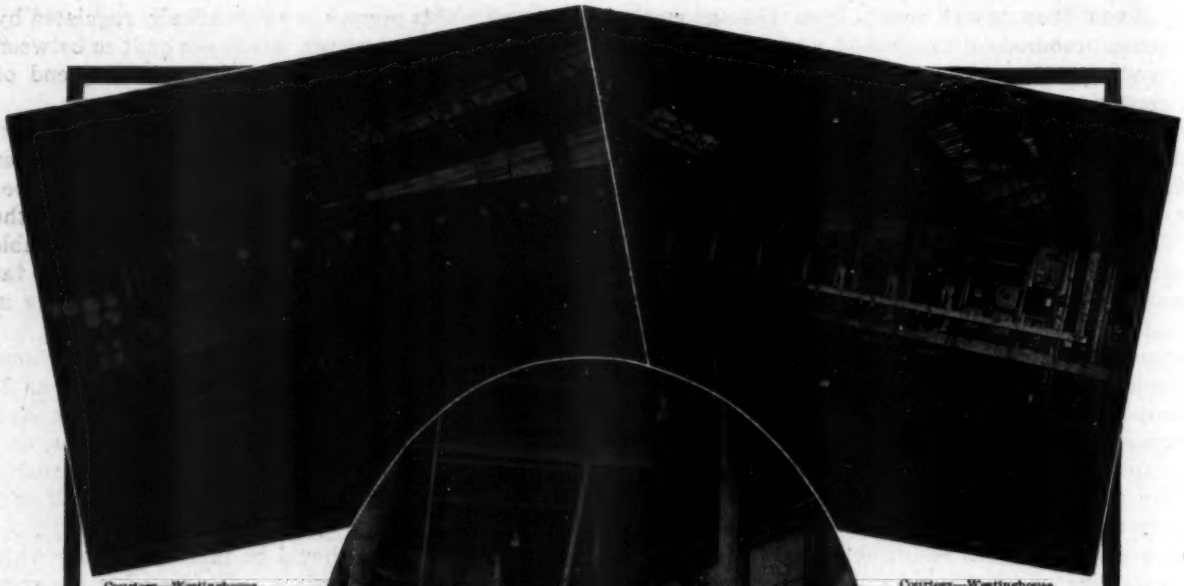
A paper machine drive is, in a sense, both an adjustable speed and a constant speed power application; as its motive power, or power transmission must provide for a range of operating speeds, which must be at any one and all of these speeds constant and not fluctuating. Various types of units have been used to drive paper machines. Sometimes combinations of units are used. In general, the following systems have been employed:

1. Direct drive from waterwheels.
2. Variable speed steam engines.
3. Constant speed steam engines with mechanical speed changing device.
4. High speed steam turbine units driving through belts or ropes.
5. High speed turbines with speed reduction gears.
6. Constant speed motors with mechanical speed changing devices.
7. Adjustable speed motors.
8. Sectional Individual Motor Drive.

(Continued on next page)

Courtesy—The National Safety Council

Speaking of "dont's" for the paper mill, the above illustration deserves the spotlight. The "No Smoking" sign in the paper mill is of great importance and in places such as this can not be too strongly emphasized

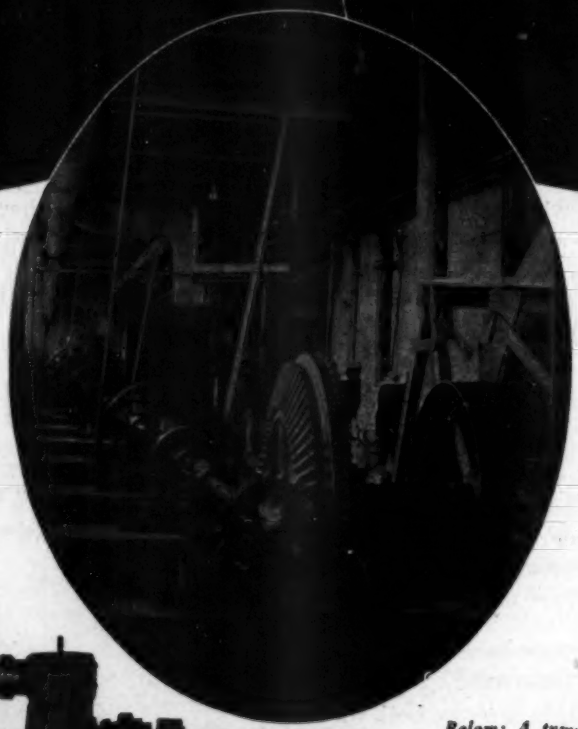


Courtesy—Westinghouse Elec. & Mfg. Co.

Above: A complete control panel for sectional paper machine drive

Courtesy—Westinghouse Elec. & Mfg. Co.

Above: A rear view of section drive control panel showing the simplicity of wiring

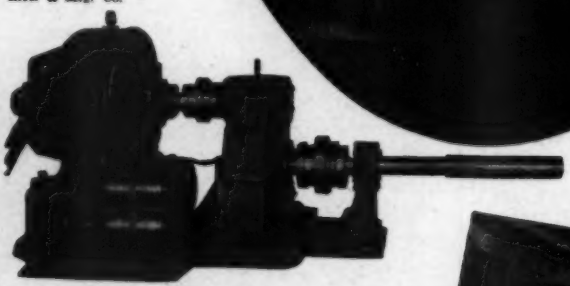


Below: A motor and gear unit with speed changer and rotary contractor

Courtesy—Westinghouse Elec. & Mfg. Co.

Left: Typical single motor — mechanical drive

Courtesy—Westinghouse Elec. & Mfg. Co.

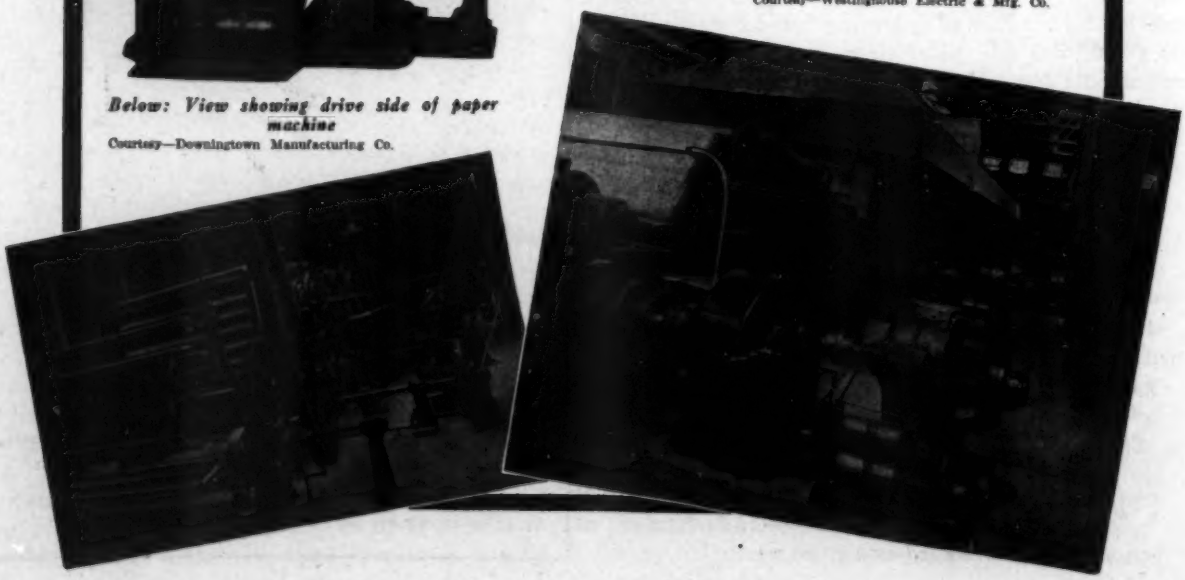


Below: A typical Westinghouse drive with reduction gear

Courtesy—Westinghouse Electric & Mfg. Co.

Below: View showing drive side of paper machine

Courtesy—Downingtown Manufacturing Co.



The first seven of the eight systems listed employed some mechanical device for varying the speed of the machine. The usual system consisted of main line shaft, bevel gears, cone pulleys with vertical belt drives, friction clutches, etc.

The Reeves variable speed transmission is one of the common variable speed transmissions found in use as a driving arrangement on paper machines. It is a mechanical device that can be installed between any source of power—either line shaft, motor, or engine—and any kind of machinery which should run at varying speeds. Its purpose is to keep these speeds under the immediate control of the operator.

This transmission is built in a number of sizes so that it may be used under conditions where the ranges in power required are from 1 to 150 H.P.

The principal parts of the machine are:

1. Frame.
2. Shafts.
3. Discs.
4. Shifting Levers.
5. V-shaped Belt.

The frame is of cast iron and is equipped with four babbitted ring-oiling boxes in which two shafts run parallel to one another. It is so built that the frame boxes, shafts, discs, collars and thrust bearings may be lifted out. The design of the frame is such that the frame boxes are also reversible. This feature makes it possible to place the transmission on the ceiling or floor by simply turning over the boxes and reversing the oilers.

Each shaft carries a pair of cone-faced discs over which runs a V-shaped belt, fitting the V-shaped groove formed by discs. The two pairs of discs are operated by a shifting lever in such a way that one pair is separated while the other pair is brought together. This operation causes the V-shaped belt to run over a smaller diameter of one pair of discs and a larger diameter of the other which makes possible the increase or decrease in speed of the variable shaft. The end thrust of each disc is cared for by a large roller thrust bearing mounted outside the long disc hub.

The shifting lever is operated by right and left hand threads which causes the separation of one pair of discs and the bringing together simultaneously of the other pair. A sprocket and chain on the shifting screw enables the operator to regulate the speed of the transmission from any point. The belt is kept in proper tension by a belt adjustment screw.

The belt is made by bolting or screwing hardwood blocks of exactly the same length and thickness to a belt body. It is necessary that the ends of these blocks be tapered to fit the face of the discs and must also be tipped with leather to provide a perfect driving surface as the driving surface is on the ends of these belts rather than on the belt body. A single row of blocks are used on the smaller machines and two rows on the larger ones.

Sometimes all of the moving parts of a paper machine are driven from a line shaft. The shaft, driven by a belt from a steam engine or electric motor, is often situated in the basement beneath the machine room and extends the length of the machine. It is not advisable to have the engine or motor directly connected to the shaft due to the great length of the shaft. If the necessity arises for such an installation, a flexible coupling should be introduced between the engine and the shaft. The turbine, on account of its high speed, is poorly adapted to paper machine drive as complicated speed reduction gears are necessary when it is used. Steam engines have been in common use for a long time since it was possible to use the exhaust steam from the engine in the dryers.

The line shaft, previously mentioned, is fitted up with cone pulleys. Openings in the floor, or scuppers allow belts to be passed from the basement drive shaft cone pulleys to the cone pulleys mounted on stands designed for paper machine service on the drive side of the machine. These cone pulleys drive the lower couch roll, lower press rolls, dryers, and bottom calender roll. It is necessary that the stands be provided with belt shifters and friction clutches for advancing or retarding the belts on the cones as needed, or to shut down any particular part of the machine independent of any other at any time.

The drive of a Fourdrinier is always split into a number of controllable parts. It is necessary because as the paper progresses through the machine it dries and actually shrinks. Drying cylinders may be driven as a single group from the one countershaft or may be separated into three or four groups.

One of the most recent developments consists of individual motors for each section of the machine. The motors are regulated by electrical devices which maintain the speed of each individual motor in its proper relation to every other motor in the drive. This development has taken place because of the desire of greater speeds, which are often limited by the mechanical system of drive rather than the characteristics of the machine itself, and the elimination of paper breakage due to inequality in the "draw" between sections. Investigations have shown that, to prevent breakage or undue strain on the paper as it passes from one section to another, it is necessary to maintain the variation of speeds between sections, as an average value, within 1/10th of 1%. The different control systems differ in detail in accomplishing these results.

The Westinghouse system originally consisted of the following parts:

For the entire paper machine as a unit—

(a) 1 Adjustable voltage DC generator.

(b) 1 Generator control panel.

(c) 1 Constant voltage exciter.

(d) 1 Duplex rotary set (or master rotary contactor unit).

For each individual section—

(e) 1 Adjustable speed DC motor.
(f) 1 Unit section control panel.
(g) 1 Mono-rotary.
(h) 1 Mechanical speed changer.
(i) 1 Rotary contactor (an electrical differential).
(j) 1 Motor operated field rheostat.

Briefly the complete system consists of an adjustable voltage DC generator of sufficient capacity to drive the entire paper machine, with direct connected exciter, a DC adjustable speed motor for each section of the machine, suitable means for connecting the motor to each section of the paper machine driving shaft, and a control system which automatically maintains the correct speed of each individual motor; together with push button stations for starting, stopping and adjusting the speed of the paper machine as a whole and temporarily adjusting the draw between sections until the permanent correction can be made by means of the small speed changers.

The adjustable voltage DC generator can be driven as part of a motor generator set by a synchronous motor, or by a geared steam turbine as desired. It is a 250 volt, adjustable voltage, separately excited machine with a constant voltage 250 volt exciter of sufficient capacity to furnish excitation for the synchronous motor field, the generator and motor fields, and for the control circuit of the regulator. A synchronous starting panel, which may be made a part of the group of control panels, is supplied with a motor generator set.

The generator control panel which may be made a part of the group of control panels, controls the entire paper machine as a unit. It contains a knife switch, circuit breaker and overload relay, voltmeter and ammeter, a motor operated master rheostat for controlling generator voltage and motor field excitation and a "fast," "slow" and a "stop" button. A push button station for the same purpose is located on the front of the paper machine at any convenient point. It is necessary to start each individual section by itself or in connection with the respective unit section control panel.

The constant voltage exciter may be direct connected to the synchronous motor generator set or turbine set, or may be a small induction motor generator set by itself. Its purpose is to excite the fields of the adjustable voltage generator and each of the adjustable speed direct current motors, and also supplies operating energy for the automatic regulator, motor operated field rheostats, etc.

The duplex rotary set is the key to the control, not only of the individual speed of each section motor but also the speed of the entire paper machine as a unit. It has the appearance of a small motor generator set on a common bedplate, and may be located at any convenient place. It controls the relay system.

An adjustable speed DC motor is supplied for each section of the paper machine with the exception of reels, slitters, cutters and rewinders. These motors may be connected direct to the section shafts or may be geared to the shafts through the Westinghouse reduction gear. The motor and gear unit is mounted on a common bedplate and connected by a flexible coupling.

The unit section control panels are fitted together to form a switchboard. This switchboard is usually located back of the paper machine near the motors driving the machine. On each panel is mounted all of the control and regulating apparatus used for controlling and regulating its related motor. In conjunction with each unit control panel is a three button push button station—"jog," "start" and "stop." The station is generally located in front of the paper machine at any convenient place. A duplicate of these buttons is on the unit panel itself. The "jog" button is used for running the section of the machine slowly as when putting on felts. The motor driving the section will run only as long as the "jog" button is held down. When a "start" button is pushed, the motor will start and accelerate in speed until it reaches the speed for which the master rheostat on the main generator panel is set. The pushing of a "stop" button will stop the motor driving its individual section. It is possible with such an arrangement to operate the paper machine with one section (such as one of the presses, or one of the calender stacks) shut down. The regulating system would function and automatically accommodate itself accordingly.

The mono-rotaries are small electric machines driven from the section shafts of the paper machine or motor shafts thru small mechanical speed changers.

The speed changers are used to give the proper draw of the paper between sections by adjusting the speed of a section relative to another section. After this "draw" is once established for one grade of stock and speed it is maintained automatically. A frequent misconception of the temporary effect of speed changes by pushing buttons exists among operators. They should remember that the speed changer is still the permanent means of correcting "draws."

A schematic lay-out as shown in the following diagram will give an idea of the general arrangements in such a system.

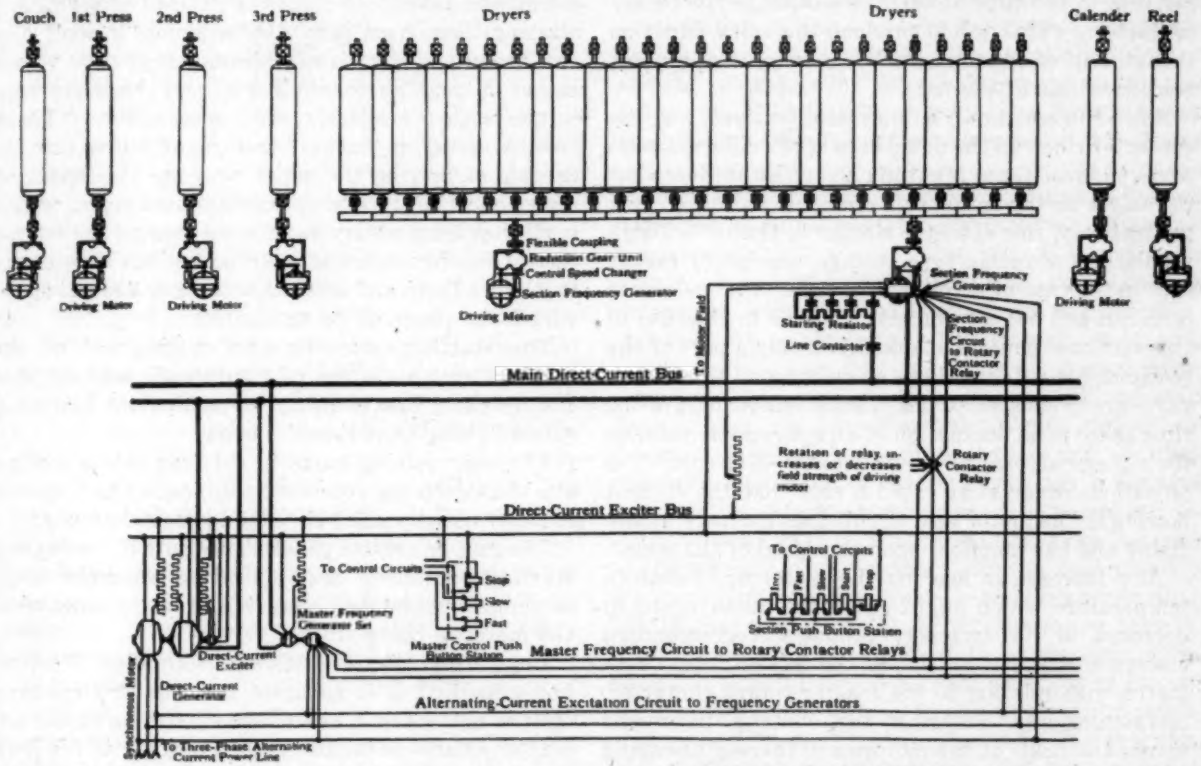
In the new Westinghouse system, the control board has a panel for the synchronous motor where one is used, a panel for the direct current generator, a master control panel, and one section control panel for each of the section driving motors.

The speed regulating system consists of a master rotary contactor and section rotary contactors together with the small speed changers.

The section rotary contactors are a sort of small commutator, i.e., a rotating drum with brushes engaging with its periphery, all of which is mounted within a small 1 H.P. motor frame. Then this rotary contactor is coupled to the lower cone shaft of the

small speed changer, the upper shaft of which is driven by means of a small chain drive from the slow speed shaft of the gear unit or from the intake shaft or motor shaft in the case of direct connected motors. These small rotary contactors and speed changers operate at low speed, never over 200 R.P.M. and usually of considerably lower speed.

The master rotary contactor consists of similar rotary contactor units (one commutator for each section) built on a longer shaft, a suitable number of collectors being provided for each section of the paper machine. These commutators or drums are driven from a small direct current motor of a fractional horsepower capacity, but built on a large frame for greater ruggedness. This entire master rotary contactor unit is mounted on a common bedplate and can be located at any convenient position, preferably close to the control board.



Courtesy—Westinghouse Electric & Manufacturing Co.

Schematic plan and wiring diagram of first Westinghouse system of sectional individual motor drive

For each section a rotary contactor and one commutator unit of the master rotary contactor, together with suitable resistance, are connected by multiple conductor cable in the shunt field circuit of that section motor.

The function of the rotary contactor is to control the effective resistance in the shunt field circuit of the section motor. The section rotary contactor and master rotary contactor operate at exactly the same speed at all times, and cannot, under operating conditions, change in speed. For instance, if an operator adds weights to a press section, adding mechanical load and following this action, the section rotary contactor being driven by the section motor tends to fall back in speed so as to lag behind the master rotary contactor a few degrees in phase position, that is, a few degrees in angular position of the section roll, a greater amount of resistance is cut into the field circuit of the section motor which causes it to correct its torque so that the motor continues to run at its correct speed, and no revolutions are lost. It is thus impossible for the section rotary contactor to fall back in phase position or for the section roll to fall back in angular displacement with respect to the master rotary contactor more than 180°, that is, more than one half revolution.

The section rotary contactor and master rotary contactor operating together when in zero phase relation with each other, form a complete short circuit or shunt around the resistance in the shunt field circuit of the motor, thereby giving the motor the strongest field possible and causing it to operate at the lowest speed possible for any given voltage on the armature. A displacement of 180° of the section rotary contactor with relation to the master rotary contactor causes all of the resistance to be inserted in the shunt field circuit of the section motor all of the time and makes the section motor operate at its maximum speed with any given voltage on its armature.

Intermediate displacement of the section rotary contactor with relation to the master rotary contactor cuts in values of resistance directly proportional to the

amount of displacement, causing the motor to operate at the correct corresponding speeds. For illustration, if the section rotary contactor of a certain motor were operating with an angular displacement of 90° with respect to the master rotary contactor under a certain condition, then all of the resistance would be cut in and out of the motor shunt field alternately, being in just 50 per cent of the time and out just 50 per cent of the time at each revolution of the rotary contactors. This would produce the same effect as though half of the total resistance were in the motor field circuit all of the time.

Since the resistance is in several sections, and the contactor rings on the drums are set in different relations, the resistance is cut in and out by steps so that the effect on the motor field circuit is uniform. In a general way, this action is similar to that of a Tirrill regulator (vibrating type voltage regulator) except that in the case of a voltage regulator, the resistance is cut in and out alternately, whereas in the case of this sectional paper machine drive, only a part of the resistance is cut in and out at a time, and the several parts are alternated so that a considerable part of the time there is no fluctuation of an appreciable value in the voltage across the motor shunt field circuit. The pulsations occur at so rapid a rate that the current flowing in the motor field circuit does not vary appreciably and has no effect upon the speed of the motor.

Any increase in load on the motor or change in temperature which might cause the motor speed to decrease or to increase, produces corresponding change in angular position of the section rotary contactor with relation to the master rotary contactor, instantaneously changing the voltage impressed across the fields of the motors and thereby changing the current value in the motor field circuit sufficiently to correct the tendency to speed change and the motor continues to operate at the same speed as before.

With this system the direct current motors operate almost exactly as synchronous motors; i.e., they are locked together in synchronism, but can be locked together in any desired speed relation, whereas synchronous motors can only be locked together in one speed relation.

The function of the section speed changers is to make possible the operation of the section motors at varying speeds depending upon the desired draw of the paper, while at the same time the section rotary contactors will operate at exactly the same speeds in R.P.M. as the master rotary contactor, which is essential. Shifting the belt on the small speed changer changes the speed relation between the section motor and the section rotary contactor so that the draw can very easily be adjusted to any desired value or relation.

The direct current motor driving the master rotary contactor operates with its armature in parallel with all of the section motors from the adjustable voltage generator bus and its field is excited from the constant voltage exciter bus from which the field circuits of all of the section motors are excited.

In all of the slower speeds and smaller machines and even in some of the larger machines, the dryer motors are made of sufficient size to easily start up the dryers from rest, which requires a very high starting torque. In some cases it is desirable to use separate starting, or "kicker" motors as they are sometimes called, for "inching" the dryers and for starting them from rest. These small "kicker" motors are provided with an additional gear ratio which makes it possible to develop a very high starting torque with a relatively small size motor. These small starting or "kicker" motors, of course, are incapable of driving the paper machine at a speed of more than 1/10 or 1/20 of its maximum speed, which is all that is necessary because as soon as the inertia of rest is overcome, the main motor can then easily accelerate them and drive them at any desired speed within the range of the equipment.

The starting, stopping and cutting out of the "kicker" motors is entirely automatic and all that the operator has to do is to manipulate his usual "start," "stop" and "inch" button.

The only moving parts in this regulating system are the revolving rotors of the section and master rotary contactors and the small speed changers.

The section control panels carry only the necessary starting equipment and indicating apparatus such as ammeters, and field relays that function only when the motor is being started.

Comparing the original and simplified Westinghouse method, it is apparent that the original principle is not changed as each has a section motor and master rotary contactor (duplex rotary) driven from the same DC electrical system and the rotary contactor (monorotary) driven through a small speed changer from section motor shaft.

The change has consisted in substituting a direct and unfailing method of changing resistance in the shunt field of the section motor for a relay system in which inaccuracies and time delays were possible. The change in "draw" is still accomplished by means of the speed changer—the method which has been found satisfactory in all mechanical drives.

The Mystery of the Wet Streak

By CHARLES KINDIG

There are perhaps few industries more thickly studded with phenomena than is the paper industry. We have all heard numerous tales of extraordinary incidents arising in the process of paper making. The appearance and disappearance spots on the paper, discolorations and the such, with their persistency and then an almost uncanny disappearance, have formed many a narrative almost as fascinating as a detective story and vastly more practical.

Someone has said, however, that there is a perfectly

good reason for everything—a mechanical reason, they say. We, therefore, welcome stories similar to the following, setting forth details regarding some specific phenomenon, what was done to offset it and under what circumstances it disappeared. We also welcome discussions aimed to give practical reasons for any of these phenomena which we will publish from time to time.—Editor.

ALL who have had anything to do with the manufacture of board know that nothing is so essential in its manufacture as the maintenance of an evenly dried sheet. In order to do this there are numerous important things to consider. First, a sheet of even quality must contain an equal amount of moisture. A wet streak not only discolors the sheet where it carries the greatest amount of moisture, but it also causes many other troubles; chief among these is breaking in the driers. This is caused by the edges pulling much harder, due to the fact that the sheet in the region of the wet streak does not shrink evenly with the edge. Naturally the backtender does his best to get the sheet dried evenly by pulling it tighter over the driers. This causes the sheet to be pulled down to the drier surface more firmly, and the closer the sheet to the drier the hotter it gets. This in turn affects the wet streak by making the sheet drier, but unevenly so, since the wet streak is still there, and when it is dried out enough to go, the edges are "bone dry." Naturally, therefore, the sheet lacks uniform quality, because each square foot of board does not carry the same amount of moisture.

The writer has seen, during his many years of experience on board machines, times when the wet streak has very much reduced production and quality.

Several months ago, we had trouble with a machine trimming 116 inches, exactly in the center of the sheet at the point of the highest crown on the wet end. The rolls were crowned a very moderate amount which naturally made us think that if we would raise the crown it would dry out the center. Our plan worked very well for some time, but finally the wet streak reappeared and by the use of the roll calipers we found that the rolls were practically the same as they were after the last grinding.

Of course there were different opinions among the men who had charge of the machine, but through the course of a few arguments and exchanging of experiences, we decided to change the position of the top first press roll, which was originally overhung about three-fourths of an inch. We moved it back to about one-fourth of an inch, and this worked very well. The machine ran good in this condition, until we were charged with the task of getting more speed and production, with quality equal to that formerly made at the lower speeds. We got the speed but we also got the wet streak, which we thought had disappeared permanently. This time we went over everything again and found all rolls in fairly good condition as to evenness of crown, still in line and perfect in every way so far as we could find.

Please bear in mind that through all this time we had always taken into consideration the condition of the felts and all things that would have a tendency to cause a wet streak, but nothing that we did would give permanent results.

After going over the machine in general, we decided to put more crown in the primary presses, which did the work very well for a time, but at all times there seemed to be a place about eight inches wide in the center of the machine that would sag down with all indications of a wet streak that would be noticeable after leaving the first press. Now, this condition existed for some few weeks, and as we went along the machine was kept in good repair, and rolls were taken care of when they did not caliper as they should.

Through all this time while we were making changes to relieve the machine of the wet streak—changes such as changing roll alignment, felts, and everything that would help to better the existing condition. The wet streak gradually left and was gone entirely for several months. Then we put on a bottom felt that had a slack center, and again it returned. As soon as this felt was taken off the machine the wet streak gave very little trouble.

There is a great difference in opinion in regards to the amount of crown that will give best results. We must admit the fact that there is no given rule. But the experience of the writer has found that in all cases, regardless of the width of machine, it is advisable to first find out the exact amount of spring there is in a series of rolls to determine the amount of crown to be used. Once you have this you can add on the amount that will give best results under the local conditions. The amount of spring is variable according to the size of roll, length, weight, and size of journals. I have found rolls to spring as much as ten-thousandths of an inch under the pressure of the weights.

After studying general conditions with the point in view of getting better results from the wet end of the board machine, you will certainly find that it is of most vital importance to the machine to have the rolls ground properly. But with each experiment do not neglect to take particular notice of the results obtained in each case. If careful attention is given to each experiment you will profit.

Pipe Breakdowns Are Often Costly

Those who have experienced pipe line breakdowns are aware of their costliness. Entire plants and hundreds of workmen may be forced into sudden idleness by such breakdowns. Correctly selected and installed piping will quickly pay for itself. As stated by Harding and Willard: "The additional cost of modern equipment is cheap insurance against a shut down."

Waste in the Pulp and Paper Mill

By JOHN A. KAGERHUBER, M. E.

IN ONE of the recent issues the writer selected a few of the leaks in the boiler house, the wood yard and wood room, and is now going a little closer to the actual producing departments of the mill, so let's take a look into the sulphite mill.

The Sulphite Mill

We are all more or less familiar with the fact that the sulphite process was originated in 1867 by a Philadelphian, B. C. Tilghman. The process itself has undergone a few changes suggested by a number of chemists and other technical men. These suggestions were, in due course, adopted and brought in usage. One of the most important changes was made by Micherlich, when he started to line digesters with brick instead of lead. Sulphite men will agree that it cost a lot of money to point digesters every so often or replace a complete lining with a new one, say every seven to eight years, and if proper research would be made an acid resisting material could be found which would not be as expensive in the initial cost, as far as first installation is concerned, but which ought to have more durability than the one used at present.

The importance of reducing the cooking time in the sulphite process without injuring the quality of the pulp should be another theme in the pulp industry. Stronger acid, dry wood, superheated steam, together with some semi-automatic devices have aided very materially in shortening the cooking time. For a spell, acid strengthened with liquid sulphur dioxide has been used in some plants with good results, but today, of course, economic conditions would not warrant the use of liquid sulphur dioxide. Here is another way to obtain a large saving, it would seem.

Supposing we would reduce the cooking time only one hour, with 300 digesters per month one can readily see without going into further details what this would mean in the course of one year. The writer believes that chips should be steamed in the digester before filling with acid. The steam is admitted at the top and a bottom valve should be left open to release the condensate, which in most cases is full of turpentine and pitch. Steaming the chips will make them more uniform in moisture and the chips will therefore absorb the acid very quickly, that is when filled under a partial vacuum. By this method the yield will be increased and the pulp becomes more uniform.

But the most important factor for economy is uniform chips. The chipping of the wood is the most conclusive factor for producing strong sulphite. The chip quality depends largely on the condition of the chipper, such as the clearance of the spout and disc, condition of wearing plates, the setting of bed plates, the disc speed, condition of face plate, properly set end trust bearings, the proper bevel, thickness, sharpness and setting of the knives, the feeding of the wood to the chipper. Chatter of wood must be avoided. If wood is short, say two feet long, longer spouts should be provided so that two or three logs can be fed in order to hold the first firmly against the disc. If we could be able to keep chippers in shape as they should be, we could eliminate crushers, rechippers, hogs, etc., and besides, we would not make as much sawdust. What a saving in power is gained, not to speak of the waste of wood, such as is caused through the use of crushers, etc. Men know what an important factor sawdust is in making good sulphite.

Digesters Should Always Be in Good Shape

The digesters should always be in prime condition. All attachments connected to the same should be tested at frequent intervals and should be absolutely correct at every period to insure safe cooks. The digester should be equipped with instruments to record density and temperature. Blow-off valves should be perfect all the time to insure good blows to the pits. Drainer bottoms in pits should always be in perfect shape so that liquor can drain off properly, as otherwise this will be troublesome on the machines.

The successful recovery of chemicals from the waste sulphite liquor is of great importance, and any means which will, and can, be brought about to raise the percentage of recovery of chemicals at a lower cost would at once offset and decrease the cost of making pulp.

Right here I wish to say that the trouble with us fellows in the paper game is that we are only doing enough research work to keep awake, whereas we should keep astride with other industries. Take the paper industry, which is as old as the hills, and let's be frank with ourselves. What progress have we made in the last twenty years? Comparatively little. If we look back at the steel industry or automobile industry we will find that we are away behind. A most urgent need in our mills is a wider use of improvements so often restricted to a few mills. The policy of exchanging ideas with the fellows of other mills should be carried out more and more. Let a waste eliminating process or a labor-saving device now in use in your mill become common knowledge for the good of other mills making a like product and soon you will find that your own problems are made much easier by the exchange of ideas taken from other mills. The results are plainly seen by industries outlined above.

The Acid Plant

Let's jump over to the acid plant for a minute and I am sure we can find a few items there. Sulphur, being one of its chief raw materials, we find in some plants that sulphur storage is not always located as good as it should be as sulphur is received mostly in box cars. This storage should be located next to a siding to reduce the cost of unloading and reclaiming. The best way of unloading is with a belt conveyor in a V-shaped trough.

Whenever I get into an acid plant I am very much reminded of the boiler house of years gone by, when furnaces were still hand fired and some unskilled firemen would keep a fire 18 inches high or over, full of holes, clinkers, etc., when most of the heat went up the stack. Of course, this is very much different now, at least in most plants, where they have good stokers and other devices. Most acid plants today are what boiler plants were then, with stopped-up coolers and weak gas.

All we need in the acid plant is a good, reliable "fireman," the same kind as you now have in the boiler house. If we have been able to improve and obtain proper combustion in the boiler house, why not do the same thing in the sulphur melters and combustion chambers. Let the gas and air have an opportunity to burn before it goes to the coolers, whereby less sulphur per ton of pulp would be consumed (a saving worth going after). Furthermore, the formation of SO_3 could be very materially reduced, although it cannot be entirely prevented. The SO_2 gas polluted with SO_3, when absorbed in the acid system, will reduce quality and quantity of acid. With poor acid one cannot make good pulp—and a poor grade of pulp has to be sold at a lower price—and if pulp is made into paper at the same mill it will show up in the paper. The manufacturing costs also jump up by waste of material.

On account of the ever increasing prices of pulp wood, sulphur and other materials, constant control should be had of all phases of the work.

The great problem of manufacturing pulp and paper at present is the saving of waste, which can only be accomplished by the proper control of its individual departments. Outline to every foreman the wastes in his department. Give him a free hand and he will eliminate waste and produce more.

The Power System

The Cost of Energy

By JOHN F. FERGUSON
Ferguson Engineers, Chicago

THE source of power for the paper mill is one of the first and most important items generally considered when undertaking any paper mill development. This power must be reliable and available at all times at a low cost if the mill is to produce a product at a fair price.

The amount of power required to produce a unit weight or a unit value of paper is generally high when we compare it with other lines of manufactured products. The power required per pound of paper varies over a wide range. Depending upon the class and grade of paper, it varies from one K. W. hour per 10 pounds of certain grades of paper board to very near one K. W. hour per pound of high grade rag stock paper. Book and coated papers will average around one K. W. hour per 3 pounds of paper; groundwood news, including wood and pulp sections, will average close to one K. W. hour per 1.5 pounds of paper; sulphite news, including wood and pulp sections, will average close to one K. W. hour per 3.25 pounds of paper.

Source of Power

There are three sources of power which cover practically all paper mill requirements, namely, steam power, water power, and purchased power. The latter is generally purchased in the form of electric power except in a few cases where water is purchased or leased for water power development. The steam power or water power may be delivered in the form of mechanical or electrical power; the electrical form of transmission has advantages over the mechanical, both from the generation, transmission and application point of view, to say nothing of the advantages that may be gained by better location of power plant and mill.

In the past it has been considered that it was out of the question to undertake paper manufacturing without water power, but water power is no more necessary for a paper mill than for a steel mill or many other industries using a large amount of power. The ground wood section of pulp mills is the one part of a plant in which water power cuts any figure, as this section requires a large amount of power and the process is such that very little heat, if any, is required in this section, so that the product is not conductive to the low cost of power production from heat, as are the other sections of the paper-making plant or industry. On account of the large amount of power required in the production of ground wood, this power must be secured at an exceptionally low figure, whether manufactured or purchased. The cost of producing same from fuel (unless there is an excess of power or heat from some other section of the mill) would be beyond economical production,

unless some other items were very favorable to compensate for the additional power costs. Hence in the case of ground wood pulp it is almost necessary to resort to water power that can be economically developed or to purchased power which can be secured at a comparatively low rate.

In considering the paper mills manufacturing practically all grades of paper and board (with the exception of high class rag stock papers), we will find that water power driven mills have little or no advantage over the all steam driven mills as regards economical production, for unless the water power can be developed at an extremely low rate and is fully available at all times of the year, it is probable that the water power supply will prove more of a handicap than an aid, due to the extra investment involved.

In the above class of mills, the power required for the entire mill in most cases can be obtained from the steam used in the process of heating and drying. Such steam power represents the very cheapest method of power production from fuel.

Cost of Power

In the paper mill it is possible to produce a K. W. hour at the switch-board on a basis of about 5,000 B. T. U. fuel delivered to boiler. If we compare this with the results being obtained at our very best, steam-electric, central power stations of Public Utilities, the average person would be amazed at the extravagance of such large stations, for the best of them are using from 18,000 to 20,000 B. T. U. equivalent fuel value at boiler to deliver 1 K. W. hour at switch-board which is from three and one-half to four times as much fuel per unit of power as is necessary in the paper mill. It may be safe to say that there are not a dozen central stations in this country coming within the 20,000 B. T. U. range, so if you are buying electric power for your paper mill, furnished by some steam-electric stations of Public Utilities, you can readily see how inefficiently the fuel is converted into power for your uses to say nothing of the additional losses in transmission and transforming to your requirements. If we take into consideration these losses it will require from 25,000 to 30,000 B. T. U. coal equivalent per K. W. hour or 5 times the possible outlay in fuel if manufactured under most modern methods in paper mills.

Another way of expressing the comparison would be to say that our best steam-electric power stations of Public Utilities have an over-all efficiency of less than 19 per cent, while our steam plant of the paper mill may run as high or higher than 70 per cent in over-all efficiency. This statement may appear to discredit the value of central stations, but it is not intended to convey this impression. The fact is, however, that the paper mill is really beyond the reach of steam-electric power service of Public Utilities, as the above figures will explain.

Instead of using the figures of 5,000 B. T. U. fuel equivalent as previously stated, which perhaps call for an exceptional class of equipment and operation to maintain, we will add 20 per cent to this to allow for many unavoidable and avoidable losses which are sure to creep in, and use 6,000 B. T. U. If we are using coal having a fair heat value of 12,000 B. T. U. this would represent one-half of a pound of coal per K. W. hour, which at $5.00 per ton equals .125 cents per K. W. hour, and at $6.00 per ton equals .15 cents per K. W. hour, and at $10.00 per ton equals .25 cents or an additional .025 cents per K. W. hour differences for every dollar per ton. On top of the equivalent value of fuel must be added the fixed charges of extra investment to generate power over and above what is necessary to produce steam for drying, heating and process, plus extra labor and maintenance cost to operate this extra equipment. The extra investment will vary over a wide range depending upon the power demand and whether such is the only source of power and requiring duplicate units or auxiliary service for reliability, but in this case we will assume that this is the only source of power and must have duplicate units for greatest reliability.

This will bring the total cost of the power to range from .5 cents per K. W. hour with the smaller plants, to as low as .25 cents per K. W. hour in the larger plants wherein are most favorable conditions. While these figures may be below the general practice yet they are within good practice, and can be accomplished in almost any case with the cheaper grades of paper. In the case of high grade paper using rags, these figures will be increased due to the increased power demand per unit weight of paper, and may with the highest grade rag paper made in very small mills reach an over-all total cost of 1 cent per K. W. hour.

This higher cost of power in the fine mill is due to the impossibility of abstracting all the power for the entire mill from the steam used in process, heating and drying, and calls for additional power to be generated by the method as used in the steam-electric central station in which a great part of the heat is lost in a condenser.

The cost of power generated by hydro-electric systems in connection with paper mills varies over a wide range, depending mainly upon the investment per unit of capacity. This ranges from .175 cents per K. W. hour in the most favorable conditions of development and operation, to well over 1 cent per K. W. hour in the most unfavorable cases.

The cost of purchased power varies over a still wider range depending upon the method of generation, locality and many items which go to make up the cost of producing and transmitting same.

The following table indicates in a general way the cost of power from the three sources, and shows the wide variation and what can be expected. From these figures it would appear that the paper mill whose power costs in excess of .5 cents per K. W. hour is more or less handicapped in economical pro-

duction of paper unless these costs are offset by other advantages, such as: better market conditions for the raw and finished stock, cheaper fuel, etc.

Comparative cost of available power per K. W. Hr.

Power	Extra Low	Low	General	High	Extra High
Man'f'd Steam	.25 c	.35c	.425c	1. c	1.25c
Water or Hydro-Electric ..	.175c	.3 c	.4 c	1. c	1.25c
Purchased	.2 c	.5 c	1.1 c	1.5c	2.25c

Eventually there will be very few paper mills operated entirely or mainly by water power, except in the ground wood pulp section, in the mill manufacturing a high grade rag paper, or in remote districts where there is an excess water supply which can be developed at an extra low figure. Unless there is sufficient water power to meet all demands of public utilities and other industries not so conducive to cheap power from fuel, such power users will outbid the paper mill for the use of this developed water power, and the paper manufacturer will find it to his advantage economically to resort to the development of the cheap steam power within his reach.

The Pulp and Paper Industry of Finland

By WILLIAM JUUL

Staff Correspondent, American Trade Press

OF THE three northernmost European countries, Finland, Sweden and Norway, which at present are the only wood, pulp and paper exporting countries of Europe, the first named, Finland, is the most densely wooded in proportion to its geographical extent. Finland has a forest area of 50 million acres, its woods extending from within a few miles of its southern shore up to and beyond the Arctic circle. They cover an area continually broken by lakes and connecting watercourses with occasional clearings where the saw and paper mills have eaten up the surrounding trees. With the exception of a little birch along the southern fringe the woods are entirely coniferous. They shelter Finland's 20,000 lumbermen, and beyond the clearings the land is left to its original inhabitants, the bear and caribou and stray wolves that come across the Russian border.

The northern section of these woods, which comprises more than two-fifths of the entire forest area, is owned by the state. It is left untouched and undisturbed by the lumberman, not merely on account of present inaccessibility to the railroad centers and high transportation charges, but also because the government by means of legislative measures tries to keep these woods as a future timber reserve. It is in the southern section where the wood and paper mills are found, and here the consumption exceeds the natural growth at present by 120 million cubic feet annually, the natural growth being estimated by experts at 1,280 million cubic feet a year and the consumption at approximately 1,400 cubic feet. This excess consumption is caused by wastefulness, carelessness in the utilization of the felled trees and non-adoption of more modern methods in the refining industries, which is perhaps best illustrated by comparing results with those in the neighboring Scandinavian countries, Sweden and Norway, where the pulp, cellulose and paper comprised 50 per cent and 70 per cent respectively, of the entire quantity of wood cut in the year 1922, while it was only 25 per cent for Finland during the same year.

The main reason for the lack of application of intensive methods of utilization and production lies, of course, in the unsettled state of the country, the lack of transportation facilities and the great distance between the mills, which renders the adoption of such methods for the time being commercially unprofitable. Comprehensive improvements have, however, been introduced where it is feasible, which is best demonstrated by the increase of the percentage of pulp, cellulose and papers from 16 per cent in 1913 to the present figure of 25 per cent.

Government Control of Coal

To overcome the excess consumption over the forest growth, coal is now being introduced and used under government legislative pressure to supplant wood as fuel on the railroads, large water power stations are being erected to supply power formerly generated by wood fire (among other places at Imatra), and efforts are being made to increase the growth of the forest by rational cultivation. Finland is taking time by the forelock, and there will be no such ruthless felling and devastation of its woods as took place in the United States before 1880. For Finland this is of vital necessity, for as no other land it is dependent on its woods in its national housekeeping, as the following will show.

During the last few years the products of Finland's wood and paper industries exceeded 90 per cent, while before the World War they constituted more than 75 per cent of its entire exports. In 1913 Finland produced 155,000 tons of wood pulp, of which 45,000 tons were exported, while the export of cellulose during the same year was 75,500 tons and that of paper 146,000 tons. During the first nine months of 1922, its exports of the same articles were as follows:

Wood pulp	approximately	40,000 tons
Cellulose	"	135,000 tons
Paper	"	144,000 tons

Of these products the United States takes a good part; in fact, Finland stands fourth among the countries from which America imports wood pulp for its newspapers.

Finland is at present greatly helped in its export by the prevailing low rate of exchange on its currency. Its export selling prices of pulp, cellulose and paper in dollars in 1922 were approximately $26.60, $34.60 and $38.60 per ton, respectively. The products of all the Finnish mills, except those of the Kyminene Aktiebolag at Kuusankoski, Finland, are handled and sold by the three sales organizations, all with headquarters at Helsingfors, Finland, Finska Cellulosaforeningen, which handles all cellulose, Finska Traesliperiforeningen, which handles wood pulp, and Finska Papersbrugsforeningen, which handles paper. The Kyminene Aktiebolag has its selling and buying office at Kuusankoski.

The machinery employed by the Finnish mills is almost all of German and British manufacture. Comparatively little American machinery has as yet been employed, although the commercial contact with the United States has been considerable, and much of the pulp and paper the latter receives might be paid for by machines. Here is undoubtedly a great opportunity for American paper machine manufacturers, especially manufacturers of machines with improved labor saving devices. The transportation of large machines from the United States to Finland offers no greater difficulties than from England and Germany, and the Finnish market is one that is in a state of rapid development.

Where Do Most Accidents Occur?

THE interest of THE PAPER INDUSTRY in the subject of safety of employees can hardly be questioned. The work of the paper and pulp section of the National Safety Council gives plenty of evidence of the constructive work that is being done, and if anything further were needed we need only to point to the pages of THE PAPER INDUSTRY for the last year for additional proof. In this period a dozen or more articles have been published which show the result of an interested study of the safety movement.

In the report on the accident records of paper and pulp plants for 1922 published on page 98 in the April issue of this journal, conclusive figures are given which prove that accidents are being reduced in the Paper Industry. The information given, however, was hardly conclusive as to the most prolific causes of accidents.

As one writer has brought out, the best way to prevent accidents is to first make conditions safe and then develop the senses of the workers which prevent accidents due to carelessness. The two senses most concerned are of course, hearing and seeing. We can develop the acuteness of the observation of workers, and also through acuteness of hearing we can do much to improve the human element part of the problem.

In a general way it will be realized that the conditions around paper mills are such as do cause accidents. The size and amount of material handled, the machines used, and the processes are, if anything, more dangerous than in most industries.

The amount of moisture around the paper mill is greatly in excess of that found in most any other type of manufacturing plant. This is bound to cause slippery conditions on floors from where moisture is very likely to be carried onto stairs and runways.

In this connection figures which have been carefully compiled on accidents should be of value. The National Safety Council issued a bulletin entitled, "The Trend of Public Accidents," in which figures were given from four eastern states. Summarized, these figures showed that accidents due to slipping or tripping amount to nearly as much as all the accidents caused by ladders, planers and jointers, belts and pulleys, cranes, gears and elevators. Since these are figures found in a general survey of all accidents, would not the hazard of slipping and tripping in the Paper Industry seem to be of extreme importance? To the casual observer it must certainly seem that the slippery conditions around a big portion of the paper mill would tend to greatly run up the average of slipping and tripping accidents.

We believe it is of vital importance that paper mills check up the causes of their accidents and see if these apparent facts are substantiated by the accidents in their particular mill. If this is the case, and if slipping and tripping are most prolific causes of accidents in paper mills, then a great improvement can be made by striking directly at this cause.

We do not know what a careful checking up would actually show, and are basing the suggestions given in this article entirely on general figures, and upon the increased hazard which paper mill conditions would seem to imply.

A number of states have recognized the great importance of this hazard as is evidenced by laws which have been passed to guard against it.

The labor law of New York State now requires that all factories over one story in height shall have stair treads so constructed and maintained that persons walking thereon shall not slip. Pennsylvania has an amendment to its Safety Standard requiring that all passageways and stairways, inclines, runways, charging decks and platforms shall be properly lighted and shall have tread services so constructed and maintained that persons walking thereon will not slip or trip.

The National Safety Council has recognized and given a good deal of prominence to this hazard. In a bulletin with which most of our readers are probably familiar, on the subject of stairs and stairways, rather complete precautions are given for protecting

inclines or ramps, stairs, landings, treads, nosings, risers, toeboards, hand rails, and special stairways in engine rooms, etc.

Practically all articles on safety which have appeared in THE PAPER INDUSTRY have made some mention or allusion to the slipping hazard.

An article on the prevention of accidents in the sulphite mill says many accidents are caused by slipping and striking against objects or falling. Another article mentions the need for good lighting, substantial and safe walks and runways in the wood room. Still another says that the way to discourage attempts to ride conveyors is to have good, substantial, well-guarded walkways up the inclines.

Defective floors are given considerable space in the discussion on two articles of Safety in the Beater Room.

In discussing Safety in the Machine Room, the statement is made that because of the large amount

Wet floors are a dangerous hazard

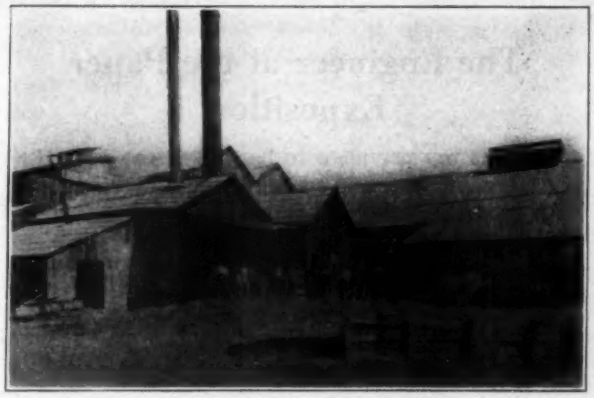
of water used, workmen often go barefoot and many minor accidents to feet therefore occur.

We shall certainly be pleased to receive any data along this line from safety engineers or others which will help the industry to reduce accidents and hazards. The first step in eliminating an undesirable condition is to get at its cause. The greatest improvement in reduction of accidents will necessarily follow a recognition of the greatest single cause of accidents, if there is one, and concentration upon the removal of this cause. The readers of this journal have the facts or can get them regarding this subject. Send them in to THE PAPER INDUSTRY and help the industry to make even a better showing in 1923 than in 1922.

From 7 to 300 Tons

We show here reproductions of photographs taken some forty-five years ago—an interior and an exterior view of the first paper mill in the West. This mill was established at Corralitos, Calif., in 1878.

Out of this pioneer start has grown the Paraffine Companies, Inc., which today is a $12,000,000 corporation, operating 15 plants, employing over 2,000 people and doing an annual business in excess of $20,000,000. The present output of their board mills is somewhat over 300 tons daily. Forty-five years ago in the plant here illustrated they had an average



daily output of 7 tons. All of this had to be hauled by horse and wagon over eight miles of dirt roads to the nearest railroad.

Not only do such facts as are here presented, together with the illustrations, help us to visualize the tremendous progress made in the paper industry during the past half century, but they rouse some-

thing of admiration within us—admiration for these early pioneers who stuck with it when facilities were few and processes laborious.

A superintendent of a large Kalamazoo mill digs this one out of his early experiences.

He came over from England to this country when only a young fellow and went right to work in the mill. Working on the same crew with him were a number of Hollanders who had been in this country two or three years and were finding the new language very difficult to master.

Knowing that our English friend had come from the "old country," one of the Hollanders asked him one day how long he had been over.

"About six months," answered the Englishman.

In a voice mingled with more amazement and admiration than good English, the Hollander exclaimed, "Gee, you learn United States talk quick!"

Pointers for the Engineer

BY W. F. SCHAPHORST, M. E.

The Engineer at the Paper Exposition

IT WAS my privilege to be present at the Paper Industries Exposition in Grand Central Palace, New York City on April 11th.

From my viewpoint as an engineer, the motive for the entire exposition can be summed up in one word, namely, Economy.

No matter what booth I stopped at I was confronted by the words, Save, Economize, No Waste, Elimination of Losses, etc.

For example, in a single booth I found one pamphlet which stated that $3,000,000 yearly can be saved by using a certain kind of a tower acid system.

In the very same booth was another pamphlet dealing with a wet machine that saves felt. No felts are required whatever. They make the claim that 30% of the fuel can be saved, that freight is saved, that production is improved and increased. All of these things, of course, are highly desirable. Economy is always desirable.

In a neighboring booth was an actual demonstration showing how to make an important saving by properly handling the white water. This is very important.

We were shown how to use the exhaust from certain heated machines in the paper mill for heating the entire mill, thereby using no extra coal for heating purposes. If all of the coal ordinarily used for heating can be saved it surely is an important item.

Valves and piping for handling alum without loss of piping due to corrosion attracted my attention. It was a very nice exhibit and if applied where needed it certainly will result in an important saving.

Ball bearings and roller bearings were demonstrated. Both of these types of bearings save much power throughout the year and their proper use is commendable. Savings resulting from the use of ball and roller bearings have been carefully worked out by engineers. Results of tests and computations are available in the transactions of the American Society of Mechanical Engineers.

One booth was devoted to lubricants. It pays to use the right kind of grease and the right kind of oil on various paper mill machinery. Concerns that have made a life study of lubrication can usually give all of us some good pointers.

A very interesting gyratory sifting, screening and cleaning machine was shown. They claim that this machine will eliminate motor trouble. It looks good and it sounded good. I have an idea that not many paper mill concerns know about this machine. Maybe I am wrong.

A novel deep well pump was exhibited—a pump that is claimed to operate at greater efficiencies that will increase the water production—all of which means more economy.

A rubber bearing was exhibited which they claim will not score the shaft because grains of sand embed themselves into the rubber in place of cutting the shaft—another saving.

An oilless bearing was exhibited. Where oil is not needed we have both a saving of oil and the saving of time usually required to apply the oil—double economy.

And thus I went from booth to booth. Those booths that did not use the word economy or similar words had a product that they claim was better, which of course means economy anyway. Just before leaving a gentleman handed me a card stating that his concern would make a microscopic examination for $3.00; a physical test for $10.00; a chemical analysis for $12.50, etc. Some readers might argue that this booth was an exception, but I claim that it was not—that it is a good thing to "know thyself and thy products." It is usually economy in the long run to know all that is to be known about ones own product.

The only criticism that I have to offer therefore is that instead of calling it the Paper Industries Exposition it hereafter be called the Paper Industries "Economy" Exposition.

Improving Plant Efficiency

INTERESTING it is to note the value of small increases of efficiency in several departments. Each increase in itself does not seem to amount to much, but when the over-all efficiency is computed the saving often becomes surprisingly large.

It is reported that a large paper mill spending $10,000 per year for coal, was desirous of increasing its capacity 50 per cent. It was at first believed that it would cost considerable in new boilers and engines, but an engineer was employed who studied the plant and concluded that an additional engine would not be necessary.

The efficiency of the boilers was increased from 70 to 75 per cent; that of the steam engine from 8 to 10 per cent; and the efficiency of the belt and pulley transmission from 70 to 80 per cent. On figuring the over-all efficiency, we get $70\times8\times70=3.92$ per cent, before the slight improvements were made. After increasing the efficiencies we get $75\times10\times80=6$ per cent, something worth while, as it is an over-all increase of 2.08 per cent, which is 53 per cent greater than the original.

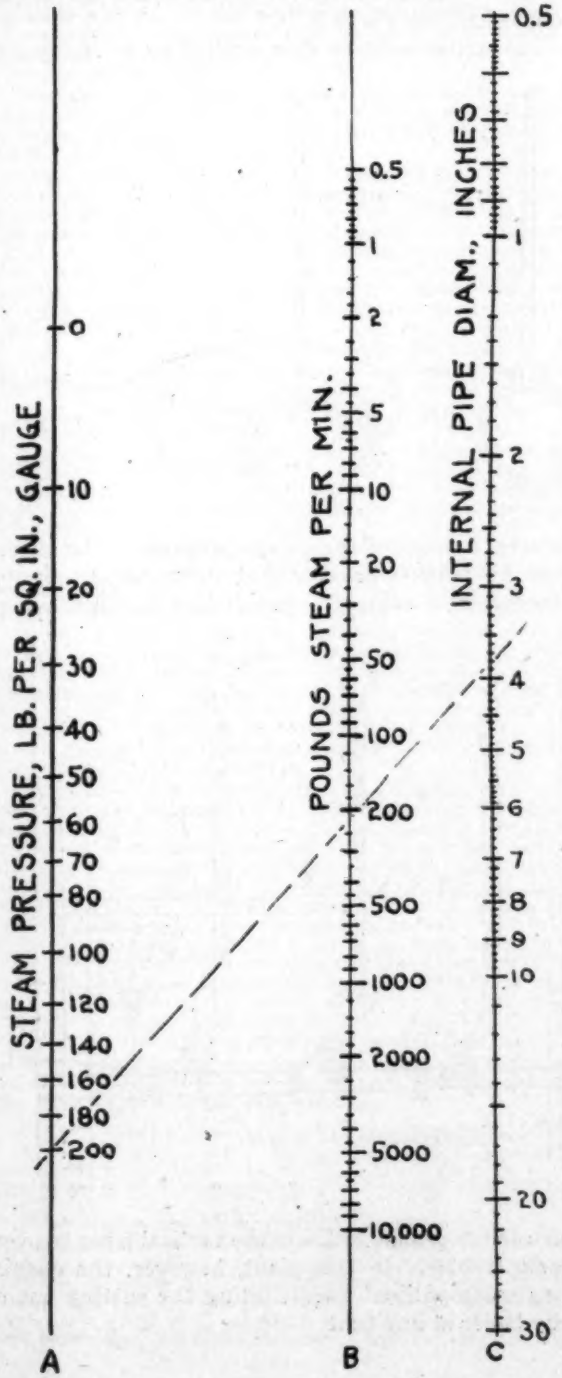
The engine had not been pulling its most economi-

cal load, and it was made to do more work by increasing the steam pressure a trifle, and improving the indicator diagram.

The only purchases made were an additional boiler, more transmission equipment and more machines. The increase in capacity was made at a satisfactory figure.

Chart for Selecting Steam Pipe

WHILE many pages have been written during recent years on the subject of steam charts and formulas, unfortunately both the charts and the formulas are usually more or less bewildering.



In the accompanying illustration is shown the result of an effort by the writer to make a chart as simple as possible—a chart that requires only one operation for the solution of the problem and one that is based upon the velocity of steam that is used most, namely, 6,000 ft. per min.

For example, what size steam pipe shall be used where the steam pressure is 200 lb. gage and where 225 lbs. of steam are to be used per minute?

The dotted line across this chart shows how easily it is done. Simply run a straight line through the 200 column A and the 225 column B and the intersection with column C gives the answer as 3.82 in. internal pipe diameter. This is very close to a 4-in. pipe, therefore a 4-in. pipe would be used.

If the steam pressure is known (column A) and the pipe is already installed, the diameter of course is a known quantity (column C) and the pounds of steam that the pipe will carry per minute is easily determined by simply connecting the known factor in column A with the known factor in column C, and the intersection with column B gives the pounds of steam per minute.

This chart will be found satisfactory for most short pipes where the pressure drop is very small, amounting to only 2 or 3 lbs. and is consequently almost negligible. Most steam pipes are short, therefore it is unnecessary to worry about the complexities to be found in most of the steam flow formulas commonly seen in print.

This chart is based upon the following simple rule, which may be used for checking purposes or for working out the problem in long hand if the reader prefers to use pencil figures rather than the chart. The rule is: "Multiply the internal diameter of the pipe in inches by itself, then multiply by 32.9 and then multiply that by the weight of one cubic foot of steam at the pressure used." The result is the pounds of steam per minute that will be carried by the pipe. The weight of steam per cubic foot may be found in most engineering handbooks; however, rather than go to the trouble of looking up these weights, for short pipe installations where absolute hair breadth accuracy is not essential and where 6,000 ft. per min. velocity is satisfactory, this chart will serve the purpose very well.

How the Leaks Were Stopped

TROUBLE was experienced in an eastern power plant by leakage of steam through joints A, B and C at the blow-off connections with a battery of Babcock & Wilcox boilers. The general arrangement is shown in Fig. I. The leakage occurred at the lower side of the joint due to the expansion of the pipe leading downward to the header. This pipe is shown in Fig. I, and a number of them are shown in Fig. II leading from their various blow-off pipes. See pipes D, E, F, G, H and J.

Although these pipes are all curved, as shown in Fig. II, they still were stiff enough to force the joints A, B and C open. It was therefore decided to make some other provision for expansion.

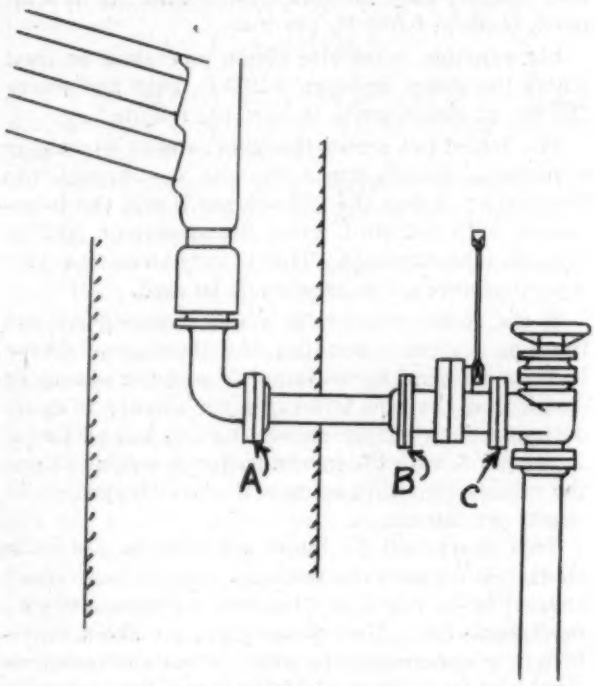


Fig. 1

This was ingeniously done without purchasing any more equipment aside from a few inexpensive compression springs and some longer bolts.

the vertical pipes. Fig. III shows another view of the hanger and loop.

Fig. IV shows how the straps were turned through 90 degrees, how the attachment with the vertical rod was made, and how the longer bolts and compression springs were arranged.

As a result the leaks have all been stopped, for instead of the tops of the vertical pipes being pushed upward the bottoms of the pipes are now allowed to expand downward as temperatures increase. The small compression springs are then compressed, gaps form between the straps as indicated in Fig. IV, and that is "all there is to it."

The writer believes this method to be of especial

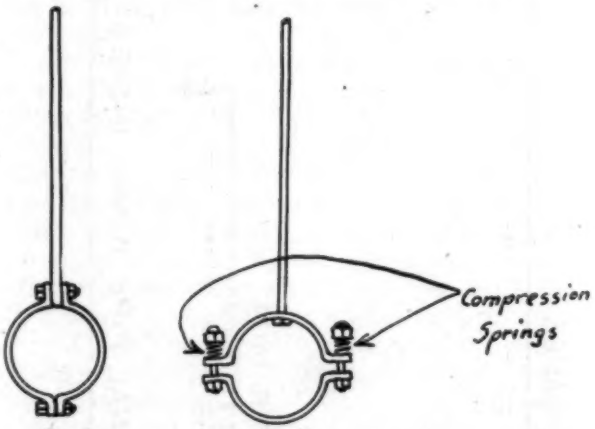


Fig. 3 *Fig. 4*

interest because of the inexpensiveness of the alteration. It is quite possible that under similar circumstances some engineers would have installed expan-

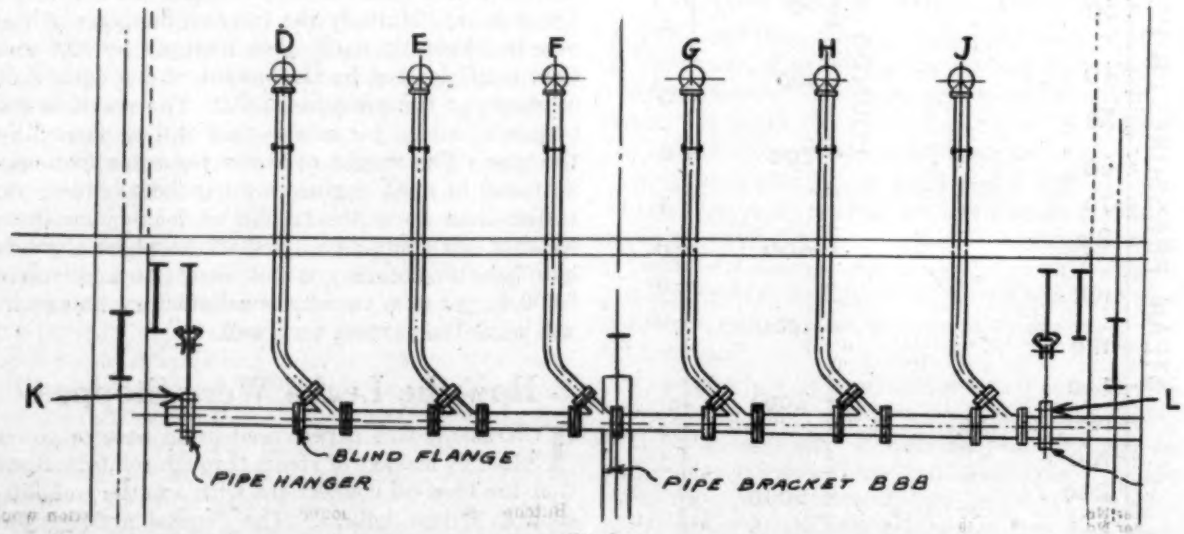


Fig. 2

The method of hanging the blow-off header is shown by K and L in Fig. II. The hangers, it will be noted, drop from I-beams and as originally designed they were not intended to "give" with expansion in sion joints or pipe bends in the vertical pipes to overcome trouble. In this plant, however, the change was made without necessitating the cutting out of any boiler at any time.

Technical Association Papers

The following papers were presented at the eighth annual convention of the Technical Association of the Paper Industry, held at the Waldorf-Astoria Hotel, New York City, from April 9 to 12 inclusive

Testing of Sizing Quality in Paper with the Valley Size Tester

By J. E. ALEXANDER

THE scope of this paper is to make some comments regarding the testing of sizing in paper with the Valley size tester as observed in using the tester in the daily routine and in special work. The theory of the Valley size tester is that the conductivity of the paper for an electric current will increase with the gradual permeating and final saturation of the paper by an electrolytic solution. A short summary of the earlier work in the determination of sizing qualities by the conductivity method will be given.

The conductivity method as suggested by Kohlrausch for determining the concentration of solutions by measuring their electrical conductivity, was applied for determination of the sizing qualities in paper by Okell.

Okell ("paper," April 11, 1917) suggested the clamping of the paper between the two compartments of a hard rubber cell and applying a solution of an electrolyte under slight constant pressure to both sides of the paper, a direct measurement of the gradual rise in conductivity through the sheet being made, as it is gradually permeated and finally saturated by the solution. The cells are set up on a Wheatstone bridge and the electrical conductivity of the paper is taken at certain intervals of time and plotted graphically against time.

Clark and Durgin (May 15, 1918) used Okell's method with a few minor modifications, in an investigation by the Paper Section of the Bureau of Standards to determine certain factors relating to the present methods of testing paper for sizing and rosin content.

Besides these applications of the conductivity methods, several paper mills have undertaken research work to determine the actual value of the conductivity method over the old ink test, but little is known of the results of these individual investigations.

The set-up with the Wheatstone bridge is too complicated for the average paper mill laboratory, and the cell is simply connected in series with a voltmeter or amperemeter. An amperemeter is to be preferred, due to its low resistance.

A set-up of the conductivity method is being made by the Valley Iron Works, and the tester is known as the Valley size tester. The same cells and containers for the electrolyte as suggested by Okell are used. A thermostat is used for keeping the electrolyte at a constant temperature and two rheostats for regulating the current. The solution used is a n/I KCl and 20% glycerine and the cell is connected in series with a milliamperemeter.

This tester has been offered the paper industry as a tester for sizing and the advantage in this tester over the ink test is that it eliminates the personal element and is always operated under the same conditions. The ink test has unfortunately been adopted by the paper men as the only test for sizing and no differences have been allowed for the use of the paper tested. A writing paper has to be fast to ink, but a butcher's paper is not expected to be fast to ink but to blood; a parchment paper fast to water or alkali, and so forth. The sizing quality necessary for one grade of paper would be quite different from another, but the ink is used in all cases as a measurement of the degree of sizing. The Valley size tester is a step to a standard accurate tester, but the conductivity method is not as accurate as could be desired.

Below are some average figures on sizing tests obtained by the Valley size tester and the ink test. The furnish and the base weights of the paper tested:

Grade	Sulphite	Groundwood	Size		Alum	B.W.	Ink Test	Valley Test
	%	%	lb.	%	lb.	lb.	sec.	sec.
Butcher No. 1	80	20	50	4.1	50	40	288	85
Butcher No. 2	60	40	40	3.3	40	40	990	151
Butcher No. 3	40	60	30	2.5	30	60	630	372

These results are rather confusing and any opinion as to the real fastness of size of these papers cannot be concluded. The ink test shows a decrease in the sizing qualities with the decrease in sizing materials and grade of furnish, but the Valley size tester shows the reverse. The ink test shows a decrease in sizing of 65 per cent between the two grades, No. 1 and No. 2, and the Valley size tester shows a corresponding increase of 78 per cent; between grade No. 2 and No. 3 the decrease with the ink test is 36 per cent and the increase with the Valley size tester is 147 per cent.

Ink tests and sizing tests performed with the Valley size tester on Butchers No. 1 and Butchers No. 2 show the following average figures over a long period of time:

Butchers No. 1		Butchers No. 2	
Valley Tester	Ink Test	Valley Tester	Ink Test
sec.	sec.	sec.	sec.
106	2040	227	868
105	2850	180	1155
97	2205	155	990
95	2700	181	690
121	2830	124	900
105	2100	183	830
117		120	
118		213	
111			
Average:106	2400	176	936

The two possible explanations of these reversed results obtained with the methods are:

1. The ink has a more rapid penetrating action on the groundwood than on the sulphite as compared with the n/I KCl solution used in the Valley size tester.
2. Differences in the degree of penetration taken for endpoint by the two methods.

One of these two explanations, the second, is the more logical. In ink case tests the endpoint is taken when the ink is evenly penetrated through the whole piece of paper exposed to the ink. In the Valley size tester the solution first penetrates the weakest point in the paper, a pinhole or its like, a short circuit is obtained, and the amperemeter registers a decrease in the resistance. The solution is now, instead of soaking evenly through the paper as in the case of the ink test, soaking in the edges around this weak point and in this way boring it up. When the endpoint is reached the rest of the paper exposed might not be nearly saturated and this weak point be the only place where the solution has penetrated through. The endpoint on the Valley size tester is 160 M.A. and the maximum reading on the amperemeter without any paper between the cells is 200 M.A.

Close Sheet Needed to Get Fair Expression

In other words at the endpoint of 160 M.A., a result is obtained of the resistance for penetration, of the solution used, of the weaker points in the paper and not the whole piece itself, and this can hardly be taken as an expression for the sizing qualities. This evidently means that in order to get a fair expression of the sizing of this tester a close sheet has to be available.

Sizing tests done with the Valley size tester on the same grade and same furnish and base weight but of different formation prove this statement.

	Maximum	Minimum	Average
Close formation	44 sec.	32 sec.	38 sec.
Wild formation	37 sec.	8 sec.	23 sec.

The two samples tested by the ink showed the same sizing. This would indicate that the uniformity of the formation has a large influence on the result from the Valley size tester.

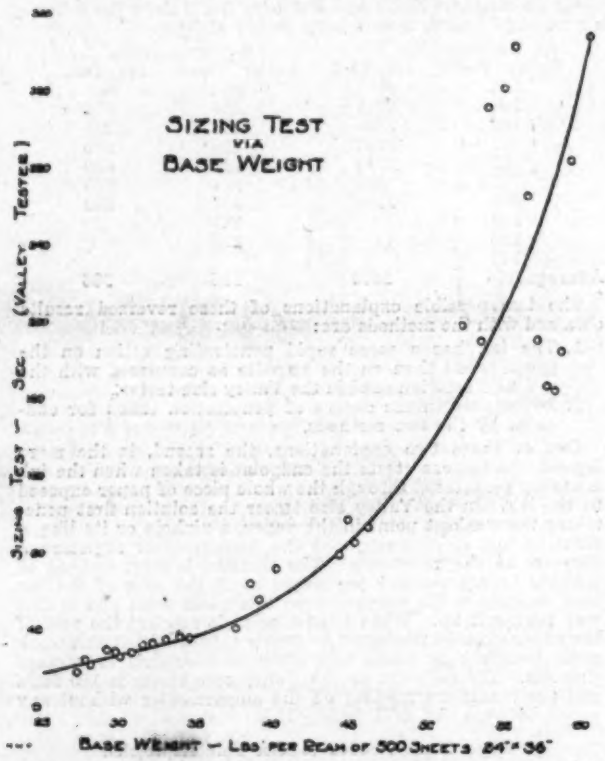
Since paper of different furnish will show a different resistance at the saturation point, the endpoint 160 M.A. will represent a different degree of penetration for different furnishes. This would mean that different grades of paper cannot be compared as to sizing by means of the Valley tester.

The foregoing regarding the influence on the results in paper of different formation and furnish would explain the reason why the grade Butchers No. 2 would show a higher sizing than Butchers No. 1 in spite of the fact that Butchers No. 2 has only 40 pounds (3.3%) of size per beater and Butchers No. 1 has 50 pounds (4.1%). The explanation would be that Butchers No. 2 is a closer sheet than Butchers No. 1, due to the larger amount of groundwood, which has a tendency to fill up the spaces between the sulphite fibers. Grade No. 3 shows a still higher sizing for the same reason. Beside the different formation the furnish is different and therefore the endpoint 160 M.A. does not indicate the same degree of penetration.

Following are some of the maximum and minimum results obtained when testing the same grades of paper for sizing:

No. of readings on the same grade of paper	Minimum sec.	Maximum sec.	Difference %
27	96	186	94
39	82	250	205
33	60	146	143
27	60	222	207
58	86	210	144
43	111	270	143
27	92	222	141

In other words, in testing the same grade of paper of the same base weight fluctuation of 154 per cent in the results



obtained can be expected. From the foregoing the following conclusions can be made:

1. The Valley size tester cannot be used for testing the sizing qualities of different grades of paper.
2. In order to get a reliable test on the same grade of paper the formation and the furnish has to be absolutely uniform.
3. The factors greatly influencing the results on the Valley size tester are, formation of the sheet and the furnish. Besides these two, the base weight has, of course, a large influence, which will be taken up later in this paper.

In this connection it might be of interest to examine the results obtained from the same paper by different operators in using the ink test and the Valley size tester. A series of mill tests were made to determine to what degree it was possible to cut down the amount of alum in the beaters. The alum was cut from day to day from 75 pounds per beater down to 37 pounds per beater and samples taken each hour to be tested for sizing. Operator A tested each sample in the Valley size tester and with the ink flotation test. The average of the results for each test of samples was confusing when compared with each other, and with the two methods used for determining the sizing. It was decided that operator C should check operator A's result on the Valley size tester, and operator B should check the results from the ink test.

Here is what they got:

Alum		Operator A		Operator B	Operator C
lb.	%	Ink Test	Valley Test	Ink Test	Valley Test
75	6.3	4	1	4	3
60	5.0	1	2	2	1
50	4.1	2	4	3	4
37	3.0	3	3	1	2

The foregoing figures represent:

1. Best
2. Next best
3. Next poorest
4. Poorest

The only conclusion that could be made was that one was as good as the other in sizing.

Influence of Base Weight on Sizing Tests

In order to get an opinion of the relation between sizing qualities of different base weights with the same amounts of sizing agents and with the same furnish, a run of paper was made on an experimental paper machine. The furnish of the paper was the same as in the grade Butcher No. 1, and the scope of the run was to determine the variation in sizing for this grade with varying base weight. The amount of sizing agents was 5 per cent size and 5 per cent alum. The stock was beaten to resemble Butcher No. 1 as much as possible and the formation of the paper made was the same because the stock was run from the same beater.

The paper was tested for sizing in the Valley size tester and ten separate samples were tested for each base weight. Following is a table covering the average results of these tests:

Base Weight, lb. (24x36)	Average	Base Weight, lb. (24x36)	Average
27.2	20	38.2	66
27.6	26	44.8	100
28.0	25	45.2	89
28.8	32	45.6	98
29.6	30	52.0	200
30.0	29	53.2	192
30.8	30	53.6	313
31.6	32	54.4	321
32.0	34	55.2	345
33.2	35	56.0	265
34.0	38	56.8	192
34.4	38	57.6	169
37.6	43	58.0	167
38.8	57	58.4	187
40.0	74	58.8	284
44.0	82	60.4	348

These results are plotted on Curve, Fig. 1. The curve can be divided into three parts:

1. The increase in the sizing quality with the increase of the base weight from 25 pounds to 35 pounds.
2. The increase in the sizing quality with the increase of the base weight from 35 pounds to 50 pounds.
3. The increase of the sizing quality with the increase of the base weight from 50 pounds to 60 pounds.

As shown in the graph the curve has different directions:

1. 25 pounds to 35 pounds being a straight line with an increase of the sizing with 2 seconds for each additional pound of base weight.
2. 35 pounds to 50 pounds being a curve with an increase of 8.5 per cent of the sizing for each additional pound base weight. This evidently invites the use of the formula for compound interest to calculate the sizing for a certain base weight from a known sizing and base weight.
3. 50 pounds to 60 pounds shows an increase of 9.3 per cent and here, as for 2, the formula for compound interest can be used.

This formula is: $a = p\ (1+r)^n$ where "a" is the amount sought; "p" is the principal; "r" the interest expressed in decimals; and "n" is the number of terms.

For example:

A paper was tested for sizing and it was found to be 140 seconds. The base weight for the same paper was 50 pounds. The sizing for the same paper of 40 pound base is sought.

$$140 = x(1 + 0.086)^n$$

$$x = \frac{140}{(1.086)^n}$$

$$\log x = \log 140 - 10 \log 1.086 = 1.78783$$

$$x = 61$$

Forty pound base weight is suggested as the standard for comparison; that means that paper tested for sizing of any base weight has to be reduced to 40 pounds and reported as such. The factors $(1 + 0.086)^n$ for 35 pound to 50 pound, and $(1 + 0.093)^n$ for 50 pound to 60 pound, have been determined for different values of n.

For reducing the results of paper of base weight of over 50 pounds or below 35 pounds, they must first be calculated to 50 pounds or 35 pounds, respectively. For paper over 50 pounds, the reduction is done by dividing by the corresponding factor, and the figure so obtained divided by 2.280. For paper below 35 pounds, add 2 seconds for each pound up to 35 pounds and divide by 0.656.

The following table shows the factors for each base weight for converting the result to 40 pound base:

1. 35 pound to 50 pound
$a = x(1 + 0.086)^n$

n.	$(1 + 0.086)^n$
35	0.656
36	0.702
37	0.767
38	0.833
39	0.900
40	1.000
41	1.086
42	1.179
43	1.280
44	1.390
45	1.510
46	1.640
47	1.781
48	1.935
49	2.100
50	2.280

2. 50 pound to 60 pound
$a = x(1 + 0.93)^n$

n.	$(1 + 0.093)^n$
50	1.000
51	1.093
52	1.193
53	1.295
54	1.560
55	1.560
56	1.705
57	1.863
58	2.036
59	2.225
60	2.432

This table shows that a paper of 48½ pound base weight shows twice as high sizing with the Valley size tester as a paper of 40 pound base weight, and a paper of 58 pounds four times as high. In examining the curve the direction indicates that at a base weight of about 65 pounds the endpoint 160 M.A. would never be reached. This is due to the fact that the resistance at the penetration for this base weight is higher than the resistance corresponding to the endpoint 160 M.A. The direction of the curve will, of course, be different for differently sized papers and for different grades. This curve is merely to show what influence the base weight will have in the testing of the sizing with the Valley size tester.

Summary

1. Some comments as to the factors influencing the results obtained for sizing tested with the Valley size tester are given.
2. The factors that influence these results are, in addition to the amount of sizing agents, the base weight, the furnish and the formation of the sheet tested.
3. A curve is given showing the increase in sizing test with the increase in base weight for a hard sized paper, the furnish being sulphite 80 per cent and groundwood 20 per cent.
4. Some results are given that indicate that the Valley size tester cannot be used for camparing paper of different grades.
5. In order to obtain a reliable test of the sizing fastness of a sheet of paper to be compared with one of known sizing, the base weight, the formation and the furnish have to be the same.

Ink Flotation vs. Valley Size Tester

By M. L. CAUST

These tests were done quite carefully to satisfy two differently interested parties. The Valley tests were made according to standard directions (35° Cent., 160 milliamps.). The flotation tests were made with ink prepared according to the formula of C. F. Sammet, the reading being taken as soon as the ink showed through.

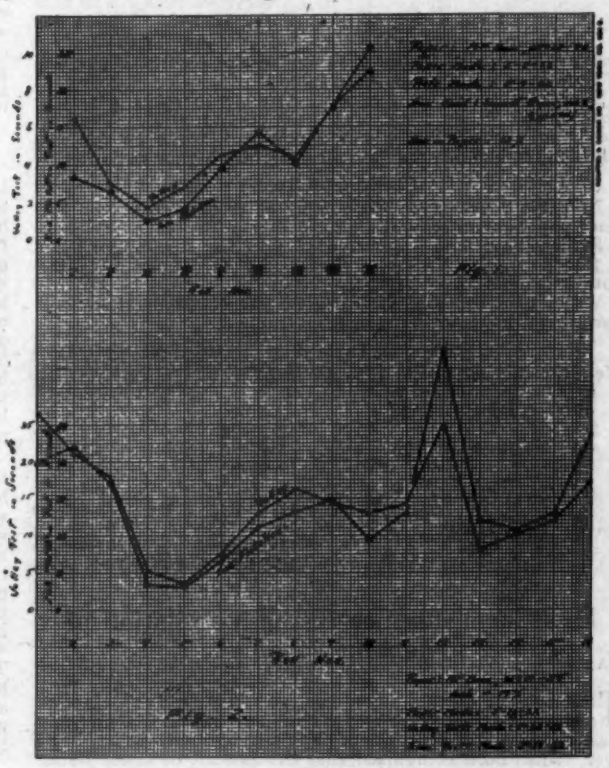


Table 1

Weight 25x38-500	Kind	Ash %	Valley: No. of Tests	Valley: Average sec.	Valley: Max. Variation from average %	Flotation: No. of Tests	Flotation: Average sec.	Flotation: Max. Variation from average %
65	Book	20	10	16.3	12	10	26.8	13
53	Book	18	4	3.6	8	4	7.5	13
65	Book	18	3	8.6	3.5	3	52.7	11
60	Book	19	3	5.0	6	3	21.3	12
59	Book	19	4	19.5	14	4	53.1	17
					Av. 9%			Av. 13%

Table 2

Weight 25x38-500	Kind	Ash %	Date of Test	Valley: Test sec.	Valley: Difference sec.	Valley: Variation %	Flotation: Test sec.	Flotation: Diff. sec.	Flotation: Varia. %
50	Antique	18		8.8	0.7	9	19	8	73
	Book			8.1			11		
59	Book	19	5-2-22	7.5	0.9	12	14.1	7.6	54
			5-5-22	8.4			21.7		
60	Book	13	4-28-22	5.4	0.4	8	21.7	0.4	2
			5-5-22	5.0			21.3		
						Av. 10%			Av. 43%

Relation Between Valley and Flotation Tests

The curves on Fig. 1 and Fig. 2 show the relation between the two methods. From these curves it may be concluded that the two methods show a general agreement, except, of course, that a paper tested by the flotation method shows a penetration in about two to two and one-half times as many seconds as is obtained by the Valley method. It is also seen from the curves that, in particular instances, the factor of flotation/Valley can be as low as 1.5 or as high as 3.5.

Comparative Accuracy of the Methods

In order to determine the superiority, if any, of the Valley tester with regard to the accuracy of the results, a number of tests were made as shown in table 1.

These results show that it is possible to make a set of tests on the Valley tester and check results with an average maximum variation of about 9 per cent, while by the ink flotation method one may expect a slightly higher variation.

Checking of Tests

In Table 2 are given the results of tests repeated on the same papers after several days.

Evidently, if it is a question of retesting a sample within a few days, the Valley method is by far superior to the flotation method.

Valley tests repeated after several months do not show such agreement, however, as seen from Table 3.

Table 3

Weight	Kind	Ash %	Date of Test	Valley Test sec.
60	Book	13	4-29-22	21.2
			12-29-22	73.5
50	Book	20	5-25-22	1.3
			12-29-22	2.7
59	Book	19	5- 5-22	8.4
			12-29-22	29.3
56	Sulphite bond		10-24-22	61
			11-17-22	101
			12-24-22	106

Heat Transference in the Ventilation of Machine Rooms

BY J. O. ROSS

THE subject of this paper has a rather formidable sound and until a few years ago would have had no place in any discussion in mill ventilation. For a good many years, however, it has been recognized that the amount of vapor rising from a paper machine had a very decided influence on the proper heating and ventilation of a machine room.

From the very earliest days it was well recognized that this vapor must be removed from the room, which was usually accomplished by allowing it to escape through openings in the roof and that was about all that machine room ventilation amounted to. It followed as a matter of course that in most machine rooms, hoods were provided over the paper machines and they were generally considered necessary.

It was not recognized that air had to enter the machine room in exact proportion to the amount removed. There wasn't very much attention paid, however, to the air entering, but nature was allowed to take its course and it was assumed that the air got in somehow. Every different arrangement of a mill had something to do with the efficiency of the vapor removal. If there was a number of buildings connected with the machine room from which air was available, the results were satisfactory. If the machine room was exposed it was found in cold weather that drafts came in around the doors and the windows, causing fog. The natural thing to do, therefore, was to close up such openings and prevent the cold air entering. It was generally noted that the production was lowered during the winter, a condition which was recognized as unfortunate but for which there was no remedy.

Even with air coming from other departments of the mill and the external openings pretty well closed up, condensation on the ceiling was frequently experienced and steam pipes were strung along the roof to keep it warm and prevent the condensation. Hoods made of wood were usually built over the paper machines connected with ventilator stacks in the roof, sometimes equipped with exhaust fans. The hood was made large enough to cover the machine and the size of the vent stacks or fans was determined pretty much from the size that had been used in some other mill of about the same size. When an exhaust fan was put in, if after running a while it was found that the roof still dripped it was considered a pretty good sign that the exhaust fan was not large enough, and another was put in, of greater capacity.

The amount of steam pipes used on the roof depended a lot on the judgment of the superintendent. The arrangement was a steam pipe in every bay or rows of pipes twelve inches apart, or eighteen inches apart, or twenty-four inches apart, depending on what would present a good appearance. That was pretty much the machine room ventilation system in the early days.

It was later found that if warm air was blown along the roof of the machine room the results were better than with steam pipes and was a special improvement in a machine room which was not connected with other departments from which to draw air, but where the air had to come in from outdoors. It was then found that the production was nearly as good in the winter as in the summer. This seemed like a great improvement and of course the more air that was blown in the less chance there was of condensation on the roof and wall interior.

Hot Air System an Improvement

There then followed an agitation to do away with the hoods over the paper machine. With the installation of a hot air system everything seemed dry in the room. Then someone had to take off the hood to replace it with a new one and found the roof did not drip. This seemed a wonderful thing and showed that hoods were not needed. Every paper maker was glad to do away with the hood because it was dirty, blocked the light, was a fine menace and an all around nuisance. Once in a while after a hood had been removed drip occurred. This was not regarded as a reflection against the ventilating system but simply proved (so it seemed) that in this particular mill the machine needed a hood. If, however, the opposition to hoods was strong, the solution was found to be simple. Blow in a lot more hot air and the roof would not drip.

Sometimes in considering a hot air installation for a mill the chief engineer or superintendent would want to know how much steam was needed for the hot air system. When he was told, it didn't seem possible that any system could take so much steam. The contractor supplying the hot air system would faithfully maintain that it was worth that much to the mill because it would keep the roof dry and result in greater production than usual during the cold weather. The paper mill man would add this amount of steam to what was being used on the machine and would say the extra production was not worth it. Neither realized that they were both wrong. The actual facts probably were that no greater quantity of hot air nor any hotter air was going out of the roof ventilators after the system was put in than before, and consequently the paper mill was not using a pound more steam afterwards than before.

In the desire to insure having a dry machine room, however, air in greater and greater quantity was calculated. Sometimes guarantees would be made that the roof would not drip but nobody guaranteed that the coal pile would not be reduced at a specified rate. Naturally as time went on more knowledge was obtained as to how to calculate the amount of air required, but this calculation was based mostly on changing the air in a machine room in a specified time. A five-minute air change was considered a fine system. A ten-minute air change was thought not so good, while a fifteen-minute air change requiring less equipment was cheaper and regarded as a pretty poor system.

With the development of the industry came an increase in the capacity of paper machines. The same room which had held a machine making twenty tons per day now held a forty-ton machine and all the figures as to air change were wrong. New ventilation systems put in new machine rooms figured at about the same size as some former installation, did not seem to give satisfaction. Rooms which formerly had been dry began to drip once more and hoods began to go back on the machines, not for the sake of economy but to protect the machine from the drip.

It will perhaps best be understood why these changing conditions continued when it is remembered that ventilation of the machine room was not a matter to cause the paper mill engineer a great deal of thought. He had more vital things to consider, mostly in regard to the machinery for making paper, and the heating and ventilation were left to the heating contractors. A heating contractor handled the heating for all kinds of buildings and seldom would the same man have more than two paper mills to figure on during his business life. Not having time to investigate and study the conditions he necessarily went mostly by what had been done before.

With the general advance in engineering knowledge of paper mill conditions not only in regard to the papermaking machinery and the power plants but also general plant efficiency, there now came a realization that the ventilation of the machine room was really an important engineering matter. Roof construction began to be studied with a view to making

the roof more efficient for paper mill conditions. It was beginning to be realized that the machine room was not simply a building, but essentially a part of a machine, being really part of the papermaking machine, another important part being the ventilating system. It then began to be realized that all the heated air which passed out of machine rooms was heated by steam somewhere in the mill and that it did not matter whether it was heated in a definite way by special apparatus or heated in the different departments from which it was being drawn or whether it took the heat from the driers or somewhere else; it was being heated somewhere in the mill and the mill had to bear the cost for heating it. It was the realization of this fact, the writer feels, has been responsible for all the advances that have been made in the science of machine room ventilation.

Proper Ventilation Affects Steam Economy

The ideal condition from the standpoint of efficiency is to have the air leaving the machine room in a saturated condition. At this it would mean that every pound of air was doing its best work, but unfortunately a condition which would give trouble due to condensation, as only a very slight drop in temperature would cause the moisture to condense. The nearer, however, this point can be practically reached without danger of condensation the better. On examination it has been found that many machine rooms had a ventilating system which was decidedly inefficient. The room might have been perfectly dry, without any drip or condensation, but the air was passing out of the ventilators in a condition very far from saturated. This meant that a far greater quantity of air had to pass out of the roof ventilators, representing a vast waste of heat. When this point was fully realized it began to be quite apparent that the ventilation had a great deal to do with steam economy in the plant. It was found that where a machine was provided with a hood, it enabled the air to pass out of the ventilators at a higher degree of saturation than if it were not hooded. This meant that less air passed through the machine room and consequently less air was heated. It therefore became apparent that a hood had some other purpose to serve besides protecting the machine from drip of condensation and a good many hoods have begun to make their appearance on the machines once more following an intelligent study of the air conditions of the mill and the moisture to be carried away.

The air may pass out containing from 10 per cent to 30 per cent more moisture which means that from 10 per cent to 30 per cent less air is required to be heated. With the return of hoods has come a demand for one of better design and construction. A hood is now considered as a machine which returns a certain amount on the investment, as it saves steam which saving can be applied towards paying for it. A new fireproof type of hood has been developed. It is built of steel frame with asbestos board covered with gypsum. It can easily be kept clean, does not deteriorate, and is an improvement in the appearance of the room. The heat is retained so that the air does not cool down before passing out of the ventilator, the result being that much more highly saturated air can be handled than in any other way.

It will be noted that the development thus far has been along the lines entirely of cutting down the amount of air which has to be heated to the minimum and a saving on heat in this air and then discharging to the atmosphere only the amount necessary to carry away the vapor. The amount of air passing out of the roof ventilators must be heated somewhere and should be heated in a definite manner and introduced into the room in a definite way. It has come to be pretty well accepted that the forced circulation of warm air into a machine room is the proper method of introducing it. The air is heated to the desired temperature usually by steam pipes and then discharged into the room by means of fans through ducts. With the realization that steam was being used to heat it, has come the realization that this air should be applied in the most efficient manner. Sufficient air should be discharged along the roof to keep it dry and warm, but an excess amount should not be applied in this way.

A vapor absorption system has been designed for the driers of the paper machine. This is a system whereby, instead of blowing all the hot air along the roof, air is introduced into the vapor pockets formed by the driers on the paper machine to absorb the vapor as fast as the moisture leaves the sheet of paper. Up to date this system has been applied mostly to machines not provided with drier felts or at least to those with drier felts only on the bottom because drier felts interfere with getting the nozzle pipes through the vapor pockets. Where this can be done, however, a great saving is secured. The air discharged into the vapor pockets greatly increases the drying efficiency of the surface of the driers by removing the damp vapor contained in these pockets. As it has been previously stated, a certain amount of air must be passed through the machine room in order to carry away the vapor produced in drying, and it will be apparent that no more air need be applied to the driers than if it were all blown along the roof. Therefore all the extra work that this air has accomplished on the machine by increasing its drying capacity, and thereby increasing the efficiency of the driers by removing the vapor as it is produced, is all a gain with no extra expense. It is safe to say that wherever possible air should be introduced in and around the machine only discharging enough air along the roof to keep the roof free from condensation.

Air in the Pit Aids Drying

On paper machines which have drier felts top and bottom, or for any other reason where it is not advisable to introduce the air into the vapor pockets of the machine, the air is often discharged in considerable part into the pit under the machine. It has lately been realized that circulation of air through the pit not only greatly increases the life of the drier felt but also greatly assists in the removal of moisture from around the machine and the consequent efficiency of the drier section. The open pit is becoming more and more common where air from the basement is allowed to pass up through the pit and out through the machine ventilators. Many variations of application are possible but the writer believes that the more direct the application of air to the machine driers, the better. If it is desired to blow air along the roof, and in nearly every case a certain amount should be handled in this way, attention should be paid to the method of introducing this air. The amount of air to be applied in this way is largely determined by the design of roof and how much heat will be lost through it by radiation.

More attention is being paid to the roof insulation with the result that less air need be blown along it to keep it dry. The writer would again emphasize, however, that this has nothing to do with the amount of air that must be introduced into the room as that is entirely dependent on the amount of vapor being produced. It does mean that more air is available for the machine or use in the pit. The beam construction of the roof, the direction in which the purlins run, the depth of the purlins or beams, have a great deal to do with the details of the proper distribution of the air. Generally speaking, the more uniform the distribution of the air over the surface of the roof the better. There are some cases, however, where the air need not be very evenly distributed and in such instances a self-contained unit, usually called a unit heater, is employed: These unit heaters are manufactured by most blower companies and in general consist of a fan and steam coils in one self contained casing, with comparatively short pipes leading from the outlets of the casing to distribute the air. It should always be borne in mind, however, that it is not well to blow too much air on one part of the roof as the danger is that a portion of it will short circuit to the ventilators without becoming properly saturated, representing a loss in steam. Local conditions will determine to a great extent the proper method of distribution.

Utilizing Heat in Waste Air

We now come to the next important phase of this problem which is the utilization of as much as possible of the heat in the air passing out of the roof carrying the moisture vapor. There is perhaps no source of waste heat that has troubled the conscience of the thoughtful paper mill engineer and superintendent more than the great loss of hot air and vapor continually escaping from a machine room into the outside atmosphere. Without even calculating it, it is evidently very great, as anyone who has been anywhere near one of these ventilators on a machine room roof can testify. It is only very recently, however, that any definite move has been made commercially to recover this heat. When it is considered that nearly two-thirds of the steam which is used on the driers of a paper machine is used only for the purpose of turning the water into vapor, it will be clearly understood that if this vapor could be condensed back into water the same heat could be recovered. The terrific amount of heat in this waste vapor can perhaps best be illustrated by one or two definite figures. On a news machine making 90 tons of paper per day, it was found that the vapor and hot air was passing out of the ventilators at a temperature of 115 degrees Fahrenheit. When this vapor was cooled down to only 87 degrees it was found that the heat recovered would be equivalent to approximately 10,000 pounds of steam per hour. That gives a pretty fair idea of the amount of heat which the average paper mill is throwing to the atmosphere.

There are two commercial ways that this heat can be recovered. There is an economizer method whereby this heat is used to heat the fresh air to be distributed to the machine room. The vapor is drawn through this economizer and passes through a series of channels. The colder fresh air entering the

ventilating system is drawn through another series of channels of the economizer and the cool air absorbs the heat from the hot vapor-laden air, causing the moisture to condense to water, this water being removed from the bottom of the apparatus. Several of these economizers are now in use and it has been found that it is possible to heat the air entering the machine room to a temperature of from 80 degrees to 90 degrees using only the waste heat which ordinarily passes out of the roof. Where the weather is colder, especially in the northern mills, the heat recovery is still greater. The enormous amount of steam saved by this method is quite apparent.

The other method of utilizing this waste heat is to use it to heat water directly by passing the vapor through a water spray. In boxboard mills this method may be utilized for heating water required for the beaters. It is usual to find that this water is not fit for boiler feed water, due to contamination, but is excellent for beaters or any other uses around the mill. It will be understood that it is not possible to heat water to a high degree with this vapor, as the limiting factor is the temperature of the vapor. In tests which have been made, however, a large volume of water has been heated from 40 degrees to 104 degrees by use of waste vapor only. These are the latest steps in the economical ventilation of a machine room.

The time is here when no first-class mill can afford to go on throwing heat to the atmosphere and at the same time using enormous quantities of steam to heat other air coming in to take its place. The most serious feature of this condition is that the maximum load on the steam plant for the ventilating system comes during the extremely cold weather just when the heaviest load occurs in the steam plant for other purposes. To anyone who has not stopped to make calculations it will be a revelation to take the quantity and the temperature of the air passing out of the ventilators and determine the amount of steam that has been used somewhere in the mill to supply that quantity of heat. The ventilating engineer and the paper mill owner today should not fear to face the matter squarely to realize that, as they must heat a large amount of air, he may as well do it definitely, knowing fully just where it is to be used, and determine that they will not heat more air than is necessary, that they will not heat it higher than necessary, and that they will heat it as far as possible by utilizing a source of heat which has been wasted in the past.

The cost of ventilating the machine room is one of the costs of doing business and as long as it is kept to the smallest amount possible it must be faced. The difference in the cost of operating a system which does not keep the machine room free of condensation compared to one that does so, and does it economically, is so slight that it is not worth considering.

The Service Factor in Selling*

By LAWRENCE W. ROGERS

EVERY man wants more success in his chosen field of labor, and salesmen are no exceptions to the rule. A salesman is just as much a human being as anybody else, (some buyers to the contrary, notwithstanding!) and if he is a normal individual, he wants to find ways and means through which he can increase his sales and make more money.

A Common Fundamental Necessary

I believe that you are all anxious to improve your work, and by this statement I by no means wish to insinuate that you have not already done splendid work and made history in your business, but I do mean that if you are normal human beings, as I know you are, you want to capitalize upon your successful experience of the past, and adding to it, whatever suggestions from others that are vitally characteristic of the practical side of business practice, move on to bigger things in the future. I believe I will be in entire accord with you in declaring that we all have this desire in common, and in view of this fact, let us establish the common fundamental premise of desire.

Desire to become more efficient salesmen, more enthusiastic salesmen, more impressive salesmen, and bigger men generally. If we would make our production grow, we must grow ourselves. A growing business must have a growing man behind it. The salesman, himself, is the proverbial power behind the throne of big production.

You have heard and read much upon the subject of personality in selling and I am sure that your respective houses are constantly giving you many fine thoughts along this line. What I want to speak to you about, is something very near to me, something very dear to me, a something that makes my being thrill and reverberate with enthusiasm, when I contemplate what it can do for present day business, the solvent oil that it can pour over the troubled commercial waters, and biggest and best of all, what it can do for you. It can solve your perplexing problems and place your feet high upon the rungs of the ladder that leads to grand and glorious achievement.

The Service Factor in Selling

Service has come to be the great word in business. It is the word that has taken the sandbagging stigma from salesmanship and lifted it to the high plane of business practice, where it belongs; and in fact, where many business houses and salesmen have always kept it.

It is an unfortunate fact, however, that service has been made a fetish in many quarters, not only by morbid business institutions looking for a new advertising slogan in sheer desperation, but by fifty-seven varieties of fly-by-night concerns, whose service idea has been more of an issue of lip service than anything else, which has not had enough gumption and has had too much gas!

Notwithstanding this, we find legitimate and constructive business sincerely reaching after, and divining the depths of this great service idea as never before. Already some marvellous discoveries have been made that will have a far-reaching effect upon the business of the future. Service is the big idea in business and of very vital importance to every salesman.

The salesman of today is, in reality, a service man, and the service ideal cannot be put across in American business, as a universal ideal, until all salesmen are afire with it. Salesmen have a mighty responsibility in life, because they are constant educators, advance agents and vanguards of new ideas and new thoughts to the trade. The salesman who does not sincerely feel this great responsibility will not be a lasting fixture with any business house.

But how can we pin this proposition down to something that is tangible and definite? How can we really feel that we are registering at least one practical idea that we can use? I will tell you just how. First, by taking account of the interests of your house; secondly, by taking account of the interests of your customer and thirdly, by taking account of your own personal interests. If you serve these three interests you will spell success; if you disregard any one of them, you will not be permanently successful.

Service to Your House

You can serve your house in a bigger way, by getting closer to it. By knowing its problems. By carrying out its policies and by giving one hundred per cent of your loyalty and cooperation. Make yourself one with it and feel yourself a part of it. If they do some odd and peculiar things at times, such as asking for an extra report, or something of the sort, be as prompt as possible in attending to it. They have a well defined reason for asking for it, or they would not bother you, and always remember that your interests are identical. I know how you feel many times. I have been there myself. I have carried a travelling bag from Fort Kent, Maine, to Los Angeles, Calif., and I thank God for it! I have first-hand information about many of the problems of the travelling salesman, but there are some things I never quite realized until I had held the position of sales manager for two different houses. The sales manager has a whole lot to answer for; he is right on the job where he has to face the music all of the time, and for the whole sales department, and it is only through your one hundred per cent cooperation that he can see to it that you receive the proper kind of service from the house and from him.

Service to Your Customer

Now the next great factor is your customer. You must serve his interests if you would hold his trade. His interests are your interests, and his success is your success. If you overstocked him, he will never feel right toward you and you may lose him. If you deceive him, you are on the way out, as far as he is concerned. If, on the other hand, you take an honest interest in him and his vital problems, if you show him that you are human and that you think he is, he will warm up to you. You will begin to find a place in his heart that will mean something both to yourself and to him. You must make yourself necessary to his business. It is this human service factor that will make you distinctive in your work; it is this service that makes buyers say, "somehow, that fellow seemed different!" He is in business to make money and you can assist him by striving to awaken his creative impulse, and giving him every practical suggestion that will help him to sell more goods. And don't overlook his salespeople. Recognize them and enlist their service in your behalf also. Have them selling you to him when you are elsewhere.

Salesmen Should Make a Study of Retail Merchandising

If every salesman would study retail merchandising more closely, even to the point of taking a reading mail course in

*Paper read before the Salesmen's Association of the Pulp and Paper Industry at their annual meeting in New York, April 12, 1923.

it, or, at least reading practical books upon the subject, it would be one of the most profitable investments he could make, because the fresh ideas obtained would enable him to be constantly making valuable suggestions to the customer as to the proper conduct of his business. You must sell him a solution to his problems.

You may say that this is not new, and yet, on the other hand, it is eternally new, because you are dealing with the human problem, which is ever as new as the day and moment!

A proper amount of personality in selling is splendid. Too much is dangerous, when it gets to the point where the salesman depends upon his personality alone, and forgets the service factor.

Service to Yourself

And now let us take account of your interests. Your service idea will be as successful as you choose to make it. If you are sold upon yourself and upon your own innate possibilities, if you have made an intensive study of your business from all angles and are inspired with the romance of it, if you have made service the supreme principle in your life and your business activities, then you are already on the road to fine achievement. Your success, in the last analysis, is dependent upon your big idea. That's the point, your own big idea! Your own vision of a success in life! Is it the vision of the thoroughbred, who will fight his way through all obstacles in the recognition that the service idea is the biggest thing in life or not? Is it the vision of the man who looks into the great tomorrow of his life and sees himself growing to a high and lucrative position in the business world? It all depends upon your big idea!

Take Account of Yourself

Take account of yourself. You know this is a hard thing to do, sometimes. It is a difficult thing to actually face ourselves and face the facts, but it is so easy to get into a treadmill, so eternally easy to become limited to our inner vision of our sales market and our personal possibilities to make a big dent in that market.

Don't Be a Side Streeter

Whatever you do, don't confine your efforts to the side streets. When you think right and have the proper estimate of yourself you are big enough to sell the biggest man in business. Study your possible market. Find out what the output of paper is in it, and then make up your mind to get a great big share of the sales.

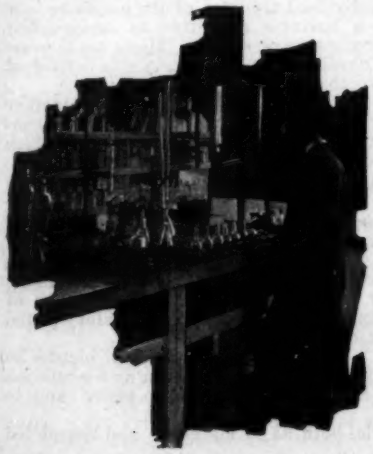
Some sage has said, "He profits most who serves best." Never was the truth of those words more potential than now. Your success with your service idea will be measured by the enthusiasm that you put back of it, and this enthusiasm that people talk so much about can only manifest itself in your work, effectively, when the big service idea is the dominating power in your life. See it, feel it, make it a living part of your endeavors; let it be your animating principle, and your service idea will sell its way to super-success, for you, in the grandest calling under the sun!

The Manufacture of Pre-Tested Leather Belting

THE use of chemical and physical tests as an aid in the production of standardized qualities of leather belting are now standard practice in the plant of the Chicago Belting Company. In this plant every known test that assists in determining and controlling belting quality is established as part of—and an important part of—the manufacturing process.

A complete chemical laboratory has been installed together with many interesting special machines for making physical tests of leather. All of these tests follow the same general description as the standard tests for leather belting adopted by the United States Government and specified by some of the largest manufacturing institutions in this country.

Manufacturing and selling—and also buying—leather belting according to tests is a vital subject to belting buyers as this method holds forth promise of enabling the buyer to have known tests that will guide him in his buying and assist him in checking his purchases after the belts have been delivered. Belts of known tests are necessarily standardized and this gives the buyer an opportunity of receiving standardized qualities which means that he can buy a belt today, or tomorrow or six months from now and receive the same belt each time.



A section of the chemical laboratory. The little dishes in front of the chemist show the scrapings from different butts used in the analysis of grease content

The use of these tests by the Chicago Belting Company enables them to manufacture leather belting and know the exact tests for tensile strength, adhesion to the pulley, grease content, permanent and temporary stretch, elasticity, piping and straightness of running for each belt. Practically every piece of leather that goes into their belts is pre-tested and the finished product is highly standardized in each of their various grades and brands.

The testing and inspection is under the direct supervision of the superintendent who is assisted by a graduate leather chemist in charge of tests and inspections. All of the belting butts are tested before they are purchased and the purchasing of the belting butts is based on the way the leather tests. In this way a big step forward is made towards the securing of uniform quality before the leather is worked on.

Chemist weighing—all leather receives a chemical as well as a physical analysis before it is purchased. The pulley at top of picture is used in the adhesion test

Then, after the leather has "passed its entrance examinations" and while it is being cleansed, fleshed, curried and built into belts, frequent inspections and tests are made for checking purposes and to aid in classifying and grading the leather into the different brands manufactured.

When the currying is done, both weight and chemical analysis tests are made to check the grease content—which is the lubricant so important to belt life. These tests are necessary as too much currying material would give the leather a false weight and reduce its adhesion, while if too little is put in, the life of the belt would suffer from lack of lubrication. All of the currying material is also tested by chemical analysis to insure purity.

At the same time tests are made to show the adhesion to the pulley of the curried leather. All of the leather is required to have a minimum adhesion to the pulley well over that specified in the Government specifications. Adhesion is very important in transmission belting as the power which a belt

will transmit is in direct proportion to the coefficient of friction of the belt—which is largely adhesion—adhesion, arc of contact and tension.

Hair Side Should Be Next to Pulley

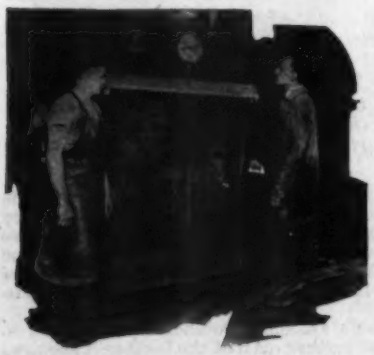
The unique quality which leather has of gripping the pulley so tenaciously is due to the peculiar character of the grain or hair side of the belt—which is always the side to be run next to the pulley. Here the hair holes act as little vacuum cups which hug the surface they pass over, in much the same way that vacuum cups of automobile tires hug the pavement. When the currying is well done this feature is brought out and accentuated and the adhesion of the belt is the measure of the success of the currying process.

Chemist and inspector making tensile strength tests on special machine built for this purpose

The tensile strength testing machine is used to break small strips of leather — regulation test size—to determine the strength of the leather at breaking point. At the same time the elongation of the leather under stress is recorded. The tensile strength test is most important in its relation to the other tests than it is by itself as the best of the belting leather —the center part— has a lower tensile than the side cuts of leather which go into other than first quality grades.

Another of the many inspections — this one for piping—made before the leather is cut up and graded

Chicago Belting leather has an average strength of about 1,000 pounds per square inch more than is specified by the Government for first quality belting —and the lower cuts of leather have still higher ratings in this one test. This strength is from ten to fifteen times the horse power rating of the belts and is a reserve possessed by good leather belts that helps to bring about the 100% overload capacity—which all good leather belts have.



Here the currying material is checked by weighing the butt before and after the lubricating material has been added

The piping test and cracking test are well known and these are made when the whole butts are inspected by the regular belting inspectors. Temporary and permanent stretch, elasticity and straightness of running are all tested on an elaborate specially built machine equipped with a device for measuring and controlling the tension at different speeds.

All of these tests and inspections have been added to the regular production schedule so that definite knowledge would be had of just what was being accomplished in each of the many operations necessary to leather belt making. The use of these tests also assures a genuinely standardized belting that can be identified by both the buyer and the seller. Belts so made have a known-in-advance performance and a uniformity of dependability.

Good leather belting was, of course, made before these tests were ever heard of—but with these methods scientific certainty has been added to the fine old traditions of belt making that have guided the belt makers in the past. Leather belt making is one occupation that requires an unusual amount of skilled labor and there are many operations requiring both judgment and a knowledge of leather. Leather is naturally a non-uniform material and the problem all leather belt makers have had to solve has been to take this non-uniform material and make it into uniform leather belting. With these tests this is done to a higher degree of perfection than ever before.

The most significant feature of these tests is that when leather belting is offered to the belt buyer with a quality based on known tests the buyer knows exactly what he is buying. The tests mentioned above will enable any belt buyer to know in advance what he is getting and place him in a better position to compare price quotations and actual values of belting offered him.

A good leather belt on a well designed drive is the most efficient and economical power transmission that there is—unless possibly steam might dispute this statement. If abuse and neglect were eliminated the belt might run forever—or nearly forever. And the cost of transmitting power after the belt was installed is cheaper than any other method of power transmission—far cheaper.

Trade Associations in Industrial Progress*

By E. W. McCULLOUGH
Manager, Fabricated Production Department,
Chamber of Commerce of the United States,
Washington

I HAVE thought to make this consideration of my subject along the line of a check-up of some of the high and low spots in association work, rather than a laudation of what has been accomplished by efficient organizations, which are outstanding examples to others. With your permission, we will consider a trade association a piece of specialized equipment and not a business cure-all.

We will also separate for this consideration, your type of organization, representing as it does a distinct line of manufacture (paper) from the conglomerate mass of organizations appearing before the public as trade associations, which are not such in fact, being neither numerically representative of a trade line nor adequate in equipment to deal with all its problems.

The trade association was created primarily to bring concerns in an industry together to meet the larger and common needs of that particular line and not as a service organization to deal with the individual troubles of its members, nor act as a life saver to a business not fitted to survive fair competition either in production or selling. Many trade associations, however, have developed splendid service to individual members, and it is a worthy endeavor.

We have before us the difficult task of bringing together hundreds of competing units in occasional meetings and conferences to select from the problems of an industry those which are most important and common to the greater number.

Purpose of Associations Now Constructive

From the time when organizations were created largely for defensive purposes to oppose inimical legislation, both national and state, and to resist unjust demands of those in control of our materials and transportation, we have passed into an era vastly more constructive and important, that of advancing the industry to higher levels, not only in the mechanics of production, but in commercial practices in the industry and service to the ultimate consumer.

I need only mention a few of these activities to picture to you the changed conditions from the time when an association meeting was a sort of armed neutrality and so many came to listen but not to talk:

Statistics of the trade, both as to materials and completed product.

Research—scientific and economic, to eliminate waste.

Accounting, including studies of cost methods and general accounting for business control.

Simplification and Standardization to determine the selection of profitable varieties of sizes, styles and kinds.

Advertising—the educational kind, to inform the public as to facts important to intelligent buying.

*Paper read before the forty-sixth annual meeting of the American Paper & Pulp Association, in New York, April 12, 1923.

Quality Standards voluntarily set up by the industry and protected by it.

Foreign Commerce, studied in its relation to the import of raw materials, also as to marketing and competition.

Safety and Welfare studied as to their application to your industry.

Ethical Codes or Business Principles—something more than moral law, to inform the newcomer as to the rules of the game and as a reminder to old-timers as well.

All of the foregoing are of direct concern to the entire industry and of constructive and progressive character, promoting common knowledge that must lead to more intelligent competition. Moreover, they are activities which can be engaged in with safety and the least temptation to wander in forbidden paths. They are, however, not easy of accomplishment under present conditions, because too many of the members of most trades today are failing to perform that second but most important obligation of their membership pledge—cooperation. Too many join cooperative associations as they buy service from private organizations with the feeling that the fee or dues paid is all there is to it, and that service and benefits will at once flow through the secretary's office.

Recently there has been some turning to private agencies for statistical service, giving as a reason that their association did not seem to be able to supply it, yet this data must be secured, if reliable, largely from the concerns making up the association. The very members who complain are frequently contributors to the delinquency of the association in functioning—they do not furnish their quota of information, yet in buying statistical information they not only pay handsomely for it but sign an ironclad agreement to supply their data when, how, and as called for—the service could not be made successful any other way. The moral obligation to a voluntary trade association is or should be just as binding and members who do not so regard it thereby contribute to the failures of those efforts of the association which do not succeed.

Perhaps we may find something between the binding of the so-called "gentlemen's agreement" which is not permitted, and the present looseness of voluntary observance of our association obligations, but here rests the cardinal weakness of most trade associations in working out their problems. I trust I may not be understood as advocating doing away with the freedom of voluntary action, for that would destroy and not construct. I am only contending for the sort of regard for membership obligations which will vision our undertakings so clearly that we will act with the same spirit which prompted the dollar-a-year man during the war—the spirit to do our bit to win.

Co-operation Essential to the Life of Associations

This may sound too ideal, but unless trade associations can so impress the duty of the cooperative function upon its members, or impose it through by-laws, to the end that calls for service, it will as now frequently fail in many important undertakings.

Let us now consider briefly, for there has been much written and spoken, the relations of the trade organization to the government, both national and state. Contrary to the opinion prevailing in some quarters, our anti-trust laws were not designed especially for the regulation of trade associations; in fact, at the time of the enactment of the Sherman law there were not so many such organizations and they were generally pursuing rather conventional programs of meeting for good fellowship, passing resolutions of good intent, but too often forgetting most of them before the next annual gathering.

The government's desire to regulate business became more apparent at the time of the passage of the Clayton and Federal Trade Commission laws. The growth of business had been rapid and brought about many complexities in business methods. Our country, once agricultural, changed in a short time to one leading the world in the importance of its industry and commerce. It was not strange, therefore, that legislation for injecting government into business in certain forms was enacted; in fact, as we have it, and I believe to stay, we may more profitably consider what are its requirements and if they really hamper our freedom. Theoretically and by statute the citizen is guaranteed equality of opportunity. This we agree is also morally right and we cannot quarrel with either our law makers or executives if the organizations we set up are also compelled to observe it.

It is charged by some that the difficulty we have with most of our regulatory legislation is that the framers of it have gone so far in trying to make it "water tight" that it is filled with ambiguities and becomes confusing and a source of worry instead of guide. However, most laws framed to protect against unfair or criminal acts are usually designed to safeguard against a small minority, but they may and do impose very often upon the unoffending majority (especially in the case of business laws) a great and unnecessary burden in working out technical compliance. There is perhaps no more glaring instance of this than the effort now being made in this state to hamper and cripple business by the passage of an act which cannot accomplish what it purports to do, but will serve to stifle initiative and enterprise and heap upon the backs of the taxpayers greater burdens—it will, however, provide more political jobs. There is perhaps no freedom from this sort of thing and we shall continue to pay the price of eternal vigilance for our liberty. There is great need of a campaign for the informing of the public along economic lines, as the bill it is making for ill-advised regulations which it must pay and that such a course pursued to the ultimate means the serious hampering of industrial prosperity.

A certain western state noted for its radical representation in Congress and revolutionary tendencies at home, has, because of its destructive legislation, driven out one of its largest manufacturers, who may be followed by many others, which that state can ill afford to lose. Such tendencies must be fought and trade associations can through cooperation do much to bring about much relief, for, in my opinion, the line of attack should be much the same as that employed by several large industrial concerns dealing with industrial relations who are visualizing for their employes the component factors making up business costs, clearly setting forth the relations of labor in making or retarding success in securing and holding business.

Monopolies Are Prohibited

Turning to the further consideration of the interpretation or lack of interpretation of our business laws considered as important to trade associations, we hear much loose talk of "twilight zones" and doubtful territory, but most of our tried and seasoned organizations put together to advance all the interests of their industries are having little difficulty. It is my view, considering the decisions of the courts and the opinions of our legal advisors, that it is quite clear that the forming of monopolies or creating restraints in trade are clearly prohibited.

To determine whether a trade association action or undertaking falls within such a prohibition is not difficult for an average group of business men; in fact, in most of the trust law cases tried, the intent to disregard the law is rather clearly shown. Again, in those instances where the consent decree method of settlement was employed there is a suspicion that the violations were more than merely technical.

Therefore, it would seem that until by amendment or other means of clarification our trust laws are made so that the average business man may read and understand them, the trade association that steers its course away from monopolies or restraints which deprive others of a fair opportunity, is in no danger.

There is a feeling on the part of some students of our trade laws and competitive system that we are approaching the time when special consideration must be given to restraints in trade which are clearly in the public interest, as some other countries have done. No doubt, our present system of free and unrestricted competition where carried to the extreme results in economic waste. This is quite evident in uncontrolled production in many industries. However, are we ready to ask the public if we may have this power of reasonable control, or is the answer to be found in so developing our statistical and informational work in our associations that on the basis of intelligence and information, individual rather than concerted action will produce the desired results?

The trade association has at its command today such a wealth of information from the fields of science, industry and commerce that its function to digest this material and pass it on to its members and to make use of it for the advance of its line, makes anything I have said unnecessary as proof of the stability of its position in industrial progress.

It is the human instrumentality of our commercial evolution along right lines if intelligently directed.

A New Continuous Beater

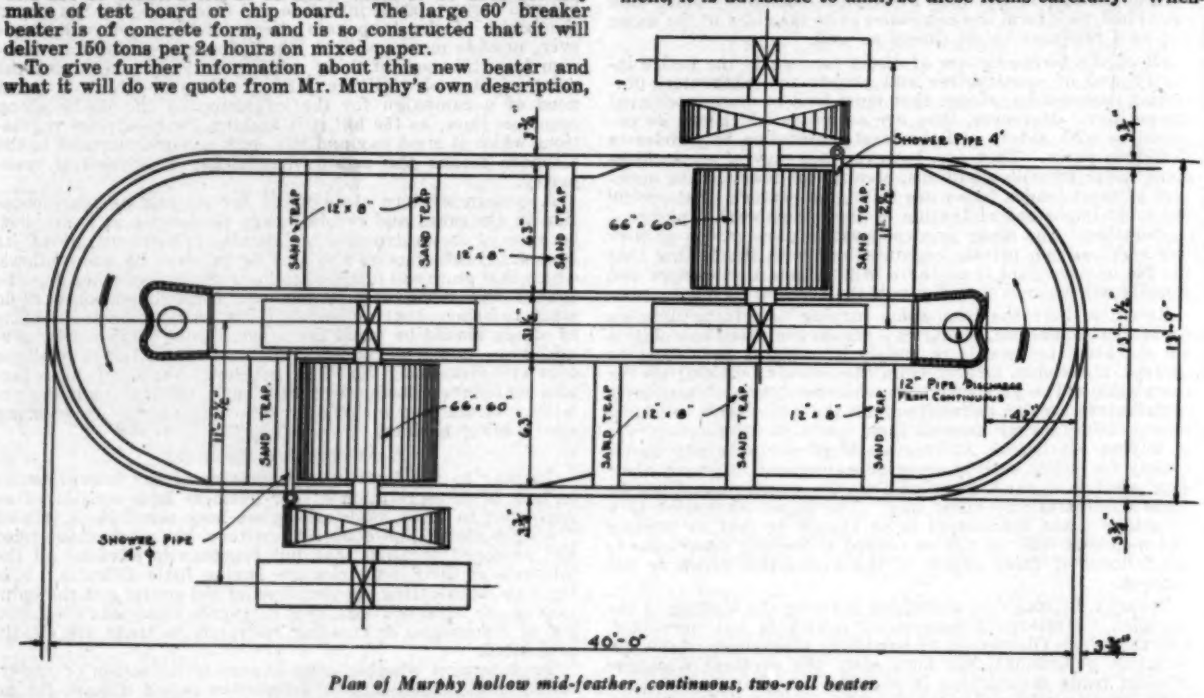
A new continuous beater has been designed by James T. Murphy, a consulting engineer who is now connected with the Valley Iron Works Company, Appleton, Wis., in the outlining of his specialty of increasing board production. Mr. Murphy is an experienced paper mill engineer both on chip board and test board and is well known in the industry.

The new beater is known as the Murphy Hollow Midfeather Continuous Beater. It has been claimed that this latest invention of Mr. Murphy's will reduce beater room help 25 per cent and required floor space 75 per cent, at the same time in-

creasing production. Further, this beater gives promise of being a great power saver.

The beaters are manufactured in three sizes. The single roll beater, 12′ x 26′, will deliver 80 tons per 24 hours on mixed papers. The double roll, 13′9″ x 40′, will deliver 120 tons per 24 hours. The two mentioned above are of the iron tub type and are so constructed as to allow them to be used for any make of test board or chip board. The large 60′ breaker beater is of concrete form, and is so constructed that it will deliver 150 tons per 24 hours on mixed paper.

To give further information about this new beater and what it will do we quote from Mr. Murphy's own description, as follows: "This beater will eliminate all foreign matter from entering your stuff chest which you know is a great saving on the agitators. It also will eliminate rags, sticks, string, wire and all other foreign matters from collecting in your valves, which is a great saving in your stock pumps and Jordans.



Plan of Murphy hollow mid-feather, continuous, two-roll beater

Waste in the Generation and Use of Steam*

By G. S. MARTINDALE

Works Engineer, Champion Coated Paper Company

WASTE in the generation and use of steam is too generic a subject to be fully covered in this discussion. I wish, therefore, to limit myself at the outset to those elements of waste which lie within the interest and jurisdiction of the superintendent and managing executive. A committee on the elimination of waste in industry of the Federated American Engineering Societies ascribe waste in industry to four primary causes:

First, low production caused by faulty management of materials, plant, equipment and men.

Second, interrupted production caused by idle men, idle materials, idle plant, idle equipment.

Third, restricted production intentionally caused by owners, management and labor.

Fourth, lost production caused by ill health, physical defects and industrial accidents.

A moment's contemplation of the breadth of this subject merely as applied to the generation of steam suggests the reasons for the limitations necessarily made.

In considering the management of materials in the boiler room, coal is the prime factor. Many engineers advocate the purchase of coal upon a scientific basis. This method, like all other scientific methods, cannot be too strongly recommended. However, the principal must be used understandingly and varied to meet all conditions. Generally speaking, coal of high B. T. U. value and low ash content should be purchased, but those industries located nearest the source of supply can afford to use cheaper grades of coal, having smaller heat value. The mines should use the cheapest of all, the fundamental reason for this being freight costs. It costs just as much to transport coal ash as it does coal carbon.

An anaylsis of coal for heat value, ash sulphur and volatiles is of great value, but it does not necessarily give a real measure of its heat value. There may exist combinations of sulphur and iron oxide which fuse into clinkers at furnace heat, resulting in much loss, due to incomplete combustion.

In the purchase of repair parts for boiler and plant equipment, it is advisable to analyze these items carefully. Whenever it is discovered that repeated orders for the same parts are made, a considerable saving can be effected by having patterns made for these parts and then purchasing castings from the foundry on a pound basis.

In considering buildings for housing boilers and prime movers, great care must be exercised in arranging and providing for the economical handling of materials at all points. It is also necessary to have complete accessibility and provide for the removal of repair parts such as boiler tubes, condenser tubes, etc. Proper ventilation is of prime importance. Working conditions for the men must be made as attractive as possible. Automatic equipment should be installed in proportion to the size and capacity of the plant.

With these preliminaries, I prefer to direct attention principally to the opportunities for eliminating waste in the operation of the boiler plant. Numerous surveys made by Government agents during the war and by industrial engineers since, have emphasized the distressing amount of waste due to inefficient operation.

Stoking Is an Art

It is authoritatively asserted and proven in my own experience on several occasions that 20% of the fuel cost may be saved without spending an appreciable amount for additional equipment, this tremendous saving being accomplished through better boiler room operation. Some executives work under the impression that automatic stoker equipment does not require as much skill in its operation as the old hand fired methods. As a matter of fact, both hand firing and stoker firing is a highly skilled art and should be supervised by a man of special training. The old-fashioned idea of a man starting in as a fireman in the boiler room and working his way up into the engine room is being discarded to a greater extent each day. There are many opportunities for the combustion engineer in his own department.

Types of boilers and furnaces should be considered in a more technical discussion. However, it should be stated at this time that economizers pay under almost any condition if they are installed correctly, especialy if we consider that they replace more than their own area of boiler surface. A raise of 11 degrees in feed water temperature before reaching the economizer or boiler will effect a saving of 1% of the fuel.

Effective soot blowers are almost indispensable for efficient

*Read before the meeting of the Miami Valley Division of the American Pulp and Paper Mill Superintendents' Assocaition. Middletown, O., March 31, 1923.

operation. The writer has seen boiler ratings jump from 100% up to 150% for all conditions practically identical, with the exception of the installation and operation of soot blowers. Superheaters are advisable wherever power is generated. However, when steam is used directly for heating purposes, there is no economy in superheat. Superheated steam radiates energy less readily than saturated steam. A great economy can be effected in the purchase of superheaters by installation of effective dry pipes so that the steam delivered to the superheaters will not contain moisture.

One of the greatest sources of waste in the boiler room is high stack temperatures. This, of course, indicates that heat is being lost up the chimney. Some of the causes of high stack temperature are due to maintaining too high a draft pressure over the fires, that is, furnishing excess air. An efficient combustion may be maintained with a minus pressure over the fires of from 2/100 to 4/100 of an inch. Boiler ratings up to 300% are often maintained regularly with a draft not to exceed 4/100. Central stations endeavor to keep excess air within from 15% to 25% of the amount required for complete combustion. Anything under 35% in industrial practice may be considered good.

The question is frequently raised as to what constitutes good practice when referring to flue gas temperatures. One authority gives us the following figures based upon 150 tests:

For 175% of rating—
550 degrees or lower—Exceptionally good results.
520 degrees to 590 degrees—Very good results.
590 degrees to 650 degrees—Good results.
650 degrees to 715 degrees—Fair results.
715 degrees to 780 degrees—Very poor results.
Above 780 degrees—Exceptionally poor results.

Making a comparison of different ratings at good results, we find that—
100% rating is—480 degrees to 520 degrees.
150% rating is—555 degrees to 605 degrees.
175% rating is—590 degrees to 650 degrees.
200% rating is—630 degrees to 695 degrees.
250% rating is—700 degrees to 785 degrees.

Flue gas temperature is a very important question and these figures may be considered as a good guide to the superintendent. It is quite possible to effect a reduction of 400 degrees F. in many plants. This will save 16% of the fuel. For every 100 degrees F. rise in stack temperatures there is a loss of 4% in fuel.

Automatic draft control is a great aid to efficient firing. Some types now on the market will control the forced draft on a minus pressure to within 2/100 of an inch and are so sensitive that when fire doors are open they will compensate for the excess draft. The design and maintenance of baffles should be carefully supervised. Frequently gases by-pass straight through boiler, resulting in much loss. Air infiltration in the brick walls is another large source of heat loss.

Combustion Should Take Place Within Furnace

Complete combustion should take place within the furnace. When combustion is not complete in the furnace, much heat passes up the chimney, having been generated too late to become effective through the boiler heating surfaces. Retarded combustion causes high CO and promotes the depositing of slag on the boiler tubes, causing further heat losses.

In an effort to confine combustion within furnace areas, boiler settings are now made much higher than was common in earlier practice. Two and one-half to three cu. ft. of furnace volume per rated boiler horse-power for stoker-driven boilers operated up to 250% of rating is now considered good practice. Volumes of from 4 to 5 cu. ft. per rated boiler horse-power are used for powdered coal.

The difficulties of perfect combustion are largely increased by the fact that ready combustion in the furnace requires a temperature of about 3,000 degrees F. The best refractive materials for use in fire-brick will withstand a temperature of only 2,200 degrees F., thus creating a condition whereby it is advisable to keep cooling off the furnace walls or radiating heat in some way to prolong the life of the side walls. Many coals fuse and form clinkers along the side walls at these temperatures and are a considerable source of expense in maintenance. We have found the use of exhaust steam on these walls a great benefit. Side wall tuyeres for the introduction of forced draft have been used with success and counteract this tendency.

Many losses in the operation of boilers are due to results of poor firing, such as holes in the fire, lack of judgment in the spreading and feeding of fuel and maintenance of proper thicknesses of fire bed and the rate of dumping ash.

The condition of feed water in boilers is of prime importance. A hardness, alkalinity and causticity of the water should be controlled within reasonable limits. Excessive amounts cause scale and deposits in the boiler and the flowing over of foreign material in the steam. Priming and foaming causes slubs of water to go over in the steam, resulting in much damage and loss. The presence of cylinder oil in the feed water is the largest factor in this condition. Adequate oil separators of proven design should be installed in exhaust lines adjacent to steam engines. As there is no oil in turbine exhaust, this source of trouble is eliminated by their use. Should the oil separators not be fully effective, it is then necessary to pass the condensate through an improved type of oil filter before passing the condensate to the water softening plant or feed water heaters. Large losses in heat sometimes occur from excessive blow-downs made necessary from scale deposits and precipitates formed by foreign materials in the feed water.

An effective water softening plant, therefore, is of prime importance. This plant should be equipped to meet the peculiarities of the local water supply. Great savings can be effected by intelligent operation, whether the zeolite, continuous or intermittent lime and soda ash process are used. Hardness should be maintained under 5 grains. Alkalinity at 6½ grains—causticity at around 2 to 2½ grains. Good operation will reduce these amounts materially. It should be understood at this point that all figures given in this discussion are average and may be subject to much debate among experts.

Automatic feed water regulators are a great aid to effective efficient boiler operation. Aside from their safety features their operation results in the conserving of boiler capacity and the meeting of fluctuating load demands with greater ease and economy of fuel.

Waste in the distribution of steam may be located by examining exhaust spouts in various parts of the plant to determine the necessity for the amount of steam which may be found escaping. It will frequently be discovered that this escaping steam may be recovered and returned as condensate to the boilers. Flow meters installed on all main steam lines will afford a means of checking this loss and properly proportioning departmental costs. Much loss on steam distribution is caused because of bare pipes. All steam pipes should be insulated with the proper pipe covering except at points where the radiated heat is desired.

Even skilled and properly trained men cannot locate all sources of waste, should intermittent observation and intuition be their only means for acquiring knowledge of their plant. It is absolutely essential in modern boiler room practice to properly equip the boiler room with modern measuring instruments.

Flue gas analysis forms an important source of control, there being many efficient CO_2 recorders on the market.

There is a great deal of wasted heat going up the stack in the form of CO when it should have combined with additional oxygen to form CO_2. Proper air control will enable the operator to maintain an average of from 12 to 16% CO_2 when coal is used for fuel which indicates a very acceptable rate of combustion.

Instruments Aid in the Checking of Waste

Boiler room instruments are vitally connected with boiler room waste. Waste means inefficiency. In order to control inefficiency, we should find means for measuring efficiency. Efficiency in its last analysis is a ratio indication of input against output. By measuring total input and total output, then properly synchronizing these records, a means may be formed by comparison for analyzing all sources of waste. Records are of value only in our ability to compare one record with another to note improvements or deteriorations. The means for acquiring a continuous record of total input and output then are of vital interest.

We have our automatic coal weighers, water weighers and meters, also steam flow meters. The difficulty lies in the fact that all these records in themselves mean but little. They should be compiled into a complete single record of total input and total output and a continuous efficiency ratio, that is, pounds of steam produced per pound of coal burned. Studies of these records, comparing one with another, can then be made to show up all causes of inefficiency. The method of observation and studying would be to maintain all conditions between a given input and output the same, with the exception of one, and note the variation in results from the variation of the one cause. In this way, by a process of elimination all causes of waste may be located.

It is my judgment that automatic means for obtaining constant record of total input, total output, and efficiency ratio will be demanded by the managers of industry when they realize the uses to which such records may be put. In fact, I know that such instruments are available awaiting this demand. The fundamental elements of this consideration have already made themselves felt in increased demand for measuring devices of all kinds, particularly of integrating

Before you paint

Read these astonishing facts

ON this page is shown one of the most amazing paint experiments ever made. It explains why Barreled Sunlight is being used today by leading paper plants throughout the country.

Three types of paint were examined and photographed through a powerful microscope.

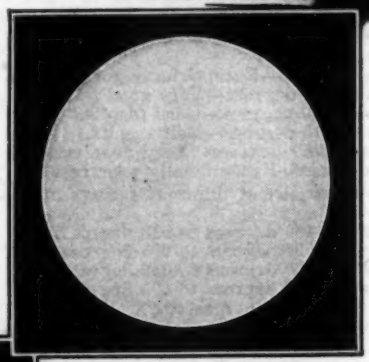
Note the difference!

These photographs show clearly why the rough, porous surface of most white paints collects dirt—and why interiors painted with Barreled Sunlight *remain clean and white without frequent repainting.*

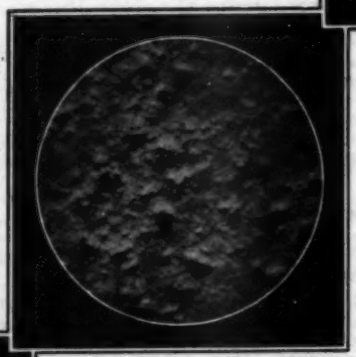
The surface of Barreled Sunlight is so smooth that it resists the smallest particles of dust and dirt! Even after years of service, it can be washed clean like white tile.

Barreled Sunlight produces a lustrous, light-reflecting finish without the glare of ordinary gloss paints. Made by our exclusive Rice Process, which removes the yellowing tendency from the oil, it is guaranteed to remain white longer than any gloss paint or enamel, domestic or foreign, applied under the same conditions.

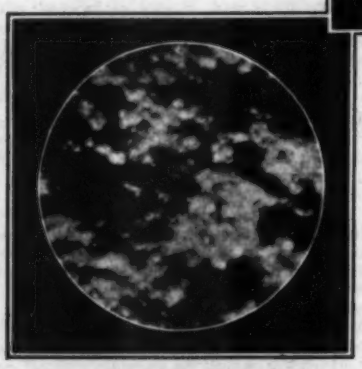
Flows freely and may be applied by brush or spray. Will not chip or scale. For places where excessive heat or fumes prevail, Chemic Enamel, a special form of Barreled Sunlight is recommended. Where more than one coat is required, use Barreled Sunlight Undercoat. Sold in barrels and cans. Send for our booklet, "More Light."



BARRELED SUNLIGHT



EGG-SHELL FINISH PAINT



FLAT FINISH PAINT

These illustrations show 3 paint surfaces as they were photographed through a powerful microscope.

Smooth enough to the naked eye—notice how rough and porous flat or egg-shell finish paint is when magnified! *The surface of Barreled Sunlight is smooth and unbroken, even under the microscope.*

"Save the surface and you save all"—Dad's Maxim

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Barreled Sunlight

THE RICE PROCESS WHITE

flow meters, which form one of the most available means for compiling this data. To this end integrators have been developed which make readings of quantity amounts of steam, oil, air, gas and water as easy to obtain as the kilowat measurements for electricity. Because of better means of measurement electricity has had other sources of power at a disadvantage for some time.

Additional sources of waste lie in the prime movers for generating power. Poor water rates for steam engines, due to leaky piston joints, poor packing and inefficient condensing are frequent. Improvement of these conditions is largely a matter of close supervision and careful maintenance. Whenever an adequate supply of water is available a high vacuum should always be maintained on any prime mover. By increasing the vacuum of a condenser on a turbine from 26 in. to 27 in., a saving of 4% of the throttle steam may be effected, increasing from 27 in. to 28 in., 5%, and from 28 in. to 29 in., a saving of 6%. These figures are for high pressure steam from 150 to 200 pounds and 2% moisture. With even 10 degrees increase in superheat up to 100 degrees and 1% increase in efficiency may be gained.

Wastes due to restricted output, labor troubles, hazardous conditions are also of great importance, but these phases of waste do not come within the province of this paper.

To summarize, it will be seen that the important considerations from the standpoint of this discussion, viz., waste in the generation and use of steam, are, first, to purchase coal with understanding; second, to maintain and furnish modern plant equipment; third, to keep operating conditions as attractive as possible; fourth, to employ men of training and experience in charge of the work; fifth, to provide an adequate number of instruments from which continuous, simple and complete records may be obtained.

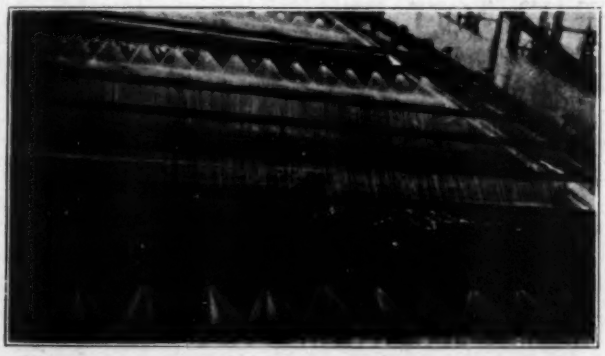
The proper carrying out of these suggestions is the problem of the management. A saving of more than 20 per cent in the coal bill may be effected over average performances in the average industries of today by giving these factors of management their proper attention.

New Shower Reduces White Water Losses

By FRED NAEGELI, Chemist

White water recovery is, at this time, a big question in the paper mill. It promises a saving of great value to the mill that can successfully effect it. The reuse of this white water, however, has brought up a good many serious and perplexing problems. Among these problems is that of clogging the spray pipes.

The Dezurick Shower Sprays in many tests have proven



very satisfactory in that they do not readily, in fact, seldom plug. Following are the results of many of these tests:

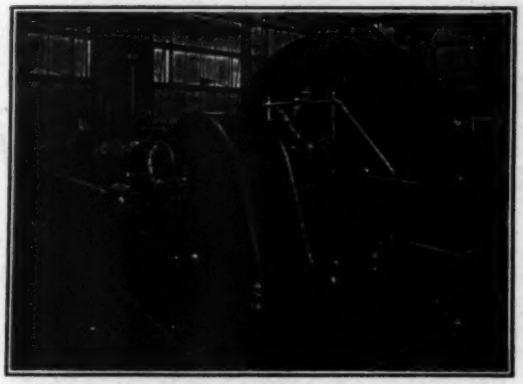
The table shown below gives a tabulated list of the results obtained by the use of three different methods for handling the white water.

System A. With a 112 per cent furnish was very unsatisfactory. Several attempts to convert system A to B proved failures. The shower pipes plugged each time. In order to operate under system B, a non-plugging shower pipe was necessary.

The type of shower used is here illustrated. A drilled pipe spray is now operating with the Dezurich shower under exactly the same conditions. The drilled spray is plugged for about one-quarter of its length and the Dezurick Shower Spray never plugged on this stock at any time.

The low recovery in the save-alls under system A was found to be due to the fact that save-all efficiency varies with the consistency of the white water which under system A was at its highest, being 4 grams per gallon or about $\frac{1}{10}$ of 1 per cent, or 8.8 pounds per 1,000 gallons.

HAMILTON ENGINES



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After system C went into effect, the consistency of the white water increased to $\frac{7}{8}$ of 1 per cent and the recovery on the save-alls jumped to 58 per cent. The save-all cylinders are covered with a 100 mesh wire.

System B uses no save-alls aside from the ground wood mill wet machines and the pulp mill save-all which is an increased save-all. The white water is run into the groundwood so that the larger fibres of the pulp can form a filter for the clay and fine white water fibres. Since the wet machine cylinders were covered with 65 mesh wire the mixing was necessary in order to get a high recovery.

System B was discarded and system C applied because of the following objections:

1—The lapped groundwood was colored by the white water.
2—Impossible to keep accurate cost against groundwood mill because of variations in the amount of white water stock retained with the pulp.

System C eliminates system B's fault and improves in the following manner:

1—Much smaller amount of stock in white water to pulp mill, thus very little coloring of lapped pulp.
2—Cost system on pulp production and per cent of furnish separated and easier to keep.
3—Higher recovery due to three filterings against two.

From results recorded on the table here shown it is evident that systems B or C are much better than system A, due primarily to replacing the use of fresh water by white water.

System	Per cent recovery	Gallons excess water daily	Daily loss computed from sewer tests Insol.	Soluble	Total computed loss	Expected per cent furnish on 80 tons	Actual per cent furnish
A	35	2,700,000	6.3 ton	4 ton	10.3 ton	112.5	115 May, 1922
B	56	970,000	2.1 ton	2.5 ton	4.6 ton	105.8	102 Jan., 1923
C	86	970,000	1.5 ton	2.5 ton	4.0 ton	104	...

A. Paper machine wire, screens and Jordan using fresh water. White water to beaters and for diluting beater stock to paper machine consistency. Excess white water through save-alls to sewer.

B. White water used throughout paper machine except froth and felt sprays. Cooling bearing water on press rolls run direct to river. Excess white water to pulp mill through wet machines to inclined screen save-all to sewer. White water used through Deszrick spray on wire.

C. Same as B only excess white water run through 100 mesh wire save-alls (recovered stock back to beater chests). Filtered white water to pulp mill as in B.

An Improved Densimeter

A new Densimeter has just been placed on the market by the Stowe & Woodward Company, Newton Upper Falls, Mass. While this was primarily designed for testing rubber rolls it may readily be used on any article of rubber.

A very attractive description is found of this new device in their bulletin No. 124.

Drying More and Better Paper With Less Fuel*

By F. C. FARNSWORTH

THE subject of drying more and better paper with less fuel is one that has taken my entire attention for the past four years. Knowing that this subject is of great interest to the paper industry, it has naturally been a very interesting four years' research work. All mills seem to be greatly interested in drying more and better paper for the reason that there seems to be an ever increasing demand for paper and the industry seems to be very optimistic, judging by the new mills that are being erected, and as to the saving of fuel, it has been absolutely necessary in the past year, as it has not only been scarce, the price high, hard to get and hard to pay for, but hard to burn.

I intend to describe herein not only the wastes of fuel I find in mills and the poor drying methods, but will show how the wastes of fuel can be stopped and the drying improved, resulting in greater quantity and better quality of paper. These results are accomplished by a very simple method of piping that affects such a suction on the syphon pipe of the dryers that water and air are sucked out of the dryers at a speed of from one to three miles per minute. This high suction enables us to suck the water out of the largest dryer ever built with not more than a half-inch syphon pipe, and further, this method of piping provides graduated drying that improves the quality of the sheet. In other words, the system provides a high circulation of steam in the dryers and hotter dryers

*Paper read before the Michigan Division of the American Pulp and Paper Mill Superintendents' Association at South Bend, March 17.

At the American Splint Corp., piling short logs 45 ft. high. Saving $16,000 yearly over hand labor

Are you spending your profits in hand labor?

40-ton car of coal unloaded in less than 30 minutes

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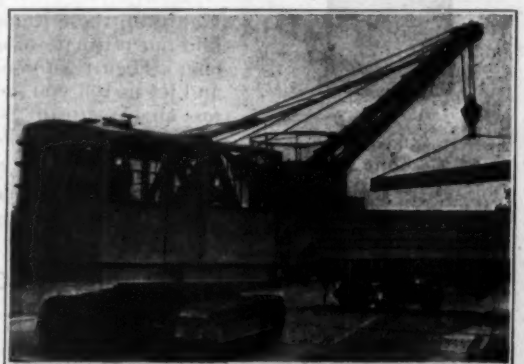

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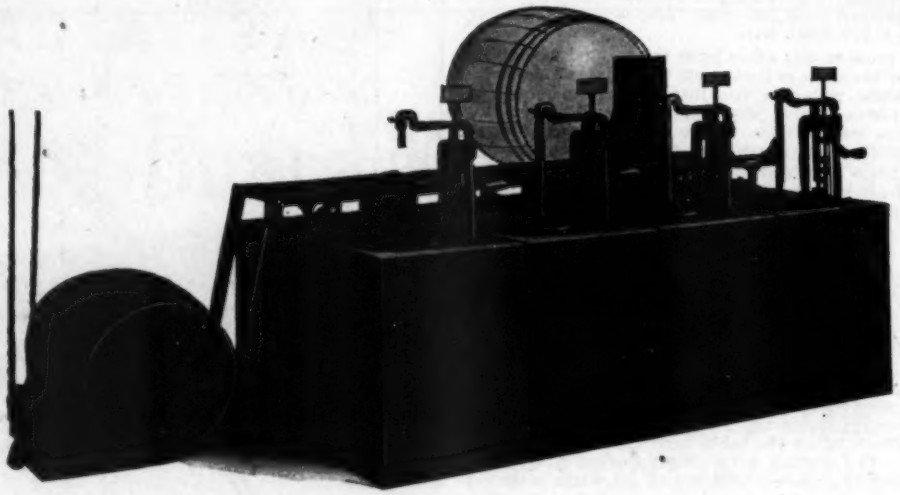

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Cut 104
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For serving gasoline to your trucks. Furnished with underground storage tank. Bears the Underwriters' label and protects from fire, explosion, spilling, leaking and evaporation, and enables you to buy gasoline in quantity at LOWER price.

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Why pay this *exorbitant* tax?

You can save it by installing an American Oil Storage System, because—

With this storage system you can buy oil in quantity at *a lower price*—you can get a *lower rate of insurance*—you can *save* a surprisingly *large amount* of oil now wasted through leakage and spillage.

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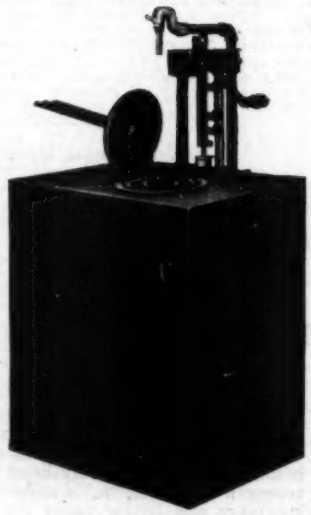
Figure up these items of saving and you will find our estimate of a fifty per cent tax a *low* one. Then take your year's purchases of oil and let us tell you *how long* it will take *to pay for* an American Storage System *with the savings* you will make.

Write for Bulletin No. 203—and learn the *saving way* to handle oil with an American system adapted to your special needs.

The American Oil Pump & Tank Company

1171 Findlay Street, CINCINNATI, OHIO.



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A clean, convenient manner for delivering oil into containers in exact quantities. Made entirely of metal, heavy and durable, cylinder and stuffing box of high-grade brass, valves of special composition metal, carefully machined and hand ground. Capacity one barrel. A safe and sanitary method of handling oils in the different departments throughout the plant.

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without retarding the flow of condensate which is kept moving at a high speed until it is fed directly into the boilers at high temperatures. The high temperatures are maintained because the condensate is held under pressure.

While it may seem strange to say that any kind of drying system would have any bearing on the quality of paper, yet a proper drying system will stop shrinkage, and cockles to a certain extent, and maintain a uniform temperature in the dryer. Elimination of fluctuating temperatures in dryers will maintain steady moisture content in the sheet. Maximum moisture content, also provides a stronger and better sheet and a better finish to the sheet. These may all be broad statements, nevertheless they are facts.

Undoubtedly the paper machine is the one piece of apparatus of great interest in the paper mill. The foremost thought is given to it when the mill is designed, however, after the mill has been completed very seldom is it exactly balanced, that is, the machine may have been designed to dry more paper than can be made or more can be made than can be dried. If the latter be the case, then the operator begins to wonder how he can make his dryers hotter or how he can improve the drying conditions to get more paper over the paper machine.

I am sure that this is a fact, as I have been in practically every mill in the United States and Canada, and for me to say that I have seen possibly two hundred various ways of drying is putting it mildly and practically every operator has changed from time to time his methods of piping the dryers and had tried out various systems, vacuum pumps, traps and various types of apparatus for producing better drying conditions. Many operators who are troubled with their drying conditions no doubt have read of various drying systems and afraid to try them for fear they would not improve their conditions, yet very often there is more loss in production and waste of coal in three months than the value of most any drying system. I maintain that in this day of modern progress and science that practically every man must confine himself to his particular line of business as a specialist and that science plays a great part in all industries. For illustration, you might explode ten thousand tons of dynamite at South Bend and not be heard in Chicago. Yet the slightest whisper of a child can be heard in Chicago by the radio. Further, if there is something wrong with your eyes you are looking for the best oculist and you are inquiring through your friends who he might be. You may be a specialist in manufacturing paper and be an excellent executive, but you may not know the fundamentals of steam. Therefore, why shouldn't the expert in drying be called to handle that problem?

I will outline herewith a few things that I find wrong in paper mills, and if any one of these things happen to remind you of your own mill, it may set you thinking. I might say first that I never pay any attention to whether you are applying modern methods for generating your steam or whether you have modern stokers or modern engines. My whole work is finding out what you are doing with the steam after you have generated it, and what you are doing with the B. T. U.'s that are in this steam and what you are doing with your condensate, and how you are handling it, and whether you are wasting steam to get your production or whether you are sacrificing your production in order to save fuel.

Many Ways Steam Is Lost

I have found return headers of the paper machines open, blowing right straight through to the feed water heater, and the feed water heater vented to the roof and the paper machine is not getting exhaust steam enough, but live steam being blowed in with the exhaust steam and blown right out through the heater to the roof. I have checked up on these wastes and found over $100.00 a day blown out through the roof for years.

I have found feed water heaters overflowing hot water to the sewer because cold water had to be applied to cool down the condensate coming from the paper machine enough so that the pump would handle it.

I have found in more than 75 per cent of the mills, feed water heaters are cooling devices rather than feed water heaters. This statement probably needs explanation, therefore I will illustrate. An engine exhaust line leading to heater, same exhaust line leading to paper machine, not enough exhaust steam, live steam being used in paper machine, condensation coming from paper machine to the heater at very high temperatures, and cold water applied to cool this condensate down sufficiently for the pump to handle. If no exhaust steam was used in the heater undoubtedly the paper machine would have had sufficient exhaust steam to dry the paper and no live steam used. I hardly know of a mill where a feed water heater is necessary, especially where the mill requires live steam in the paper machine and in addition to the exhaust steam. When this is the case, what is the use

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ASBESTOS PACKED COCKS

Fig. 248

Vulcanized asbestos groove-packed iron cocks for rugged service or caustic lines. Especially adapted for use on digesters.

Pratt & Cady asbestos packed cocks are made to stand pressures up to 250 lbs. and temperatures up to 500° F. Their use will prove economical.

Fig. 247

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Pratt & Cady Division
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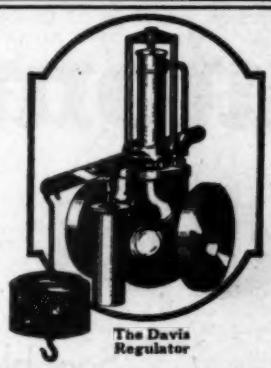

The Davis Regulator

Solves Pressure Regulating Problems

IN many paper mills there is a place where no reducing or regulating valve is entirely satisfactory—a place where, for some reason or other, ordinary valves can't stand the gaff.

That is the place for the Davis Regulator. The most strenuous service does not put it on the sick list; it keeps out of trouble.

Wherever high pressure steam is to be automatically reduced to a constant lower pressure, the Davis Regulator *serves*. Faultless construction and a principle of operation that has been tested in service since 1875 keep the Davis on the job—on the job, sometimes, where other regulators have failed. Let the G. M. Davis Regulator Co., 414 Milwaukee Avenue, Chicago, send you the catalog; it also describes a complete series of better valve specialties.

DAVIS VALVE
STEAM SAVERS SINCE 1875
SPECIALTIES

CHECK YOUR BOILER

KEEP AN ACCURATE ACCOUNT OF COAL CONSUMED DAILY

WELLER MADE CHICAGO

A Weller Weigh Larry installed in your boiler room will not only help to reduce your coal bill but will make the handling of the coal easier.

Illustration shows a complete Weller Coal Handling System, including Storage Bin, Bin Gates, Bucket Elevator and Weigh Larry.

We maintain a competent engineering department and will gladly assist in the selection of equipment best adapted to your requirements.

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DETROIT, MICHIGAN, U.S.A.

of taking exhaust steam to the heater and live steam into the paper machine? The average feed water heater is just a receptacle to feed the condensate and cool it down sufficient for the pump to handle. An ordinary tank would answer the same purpose. This may seem like a hard blow to the heater manufacturer, but think it over; in other words, some operators are going to say that they have considerable make-up water to heat, and how would this water be heated if they didn't use a heater? I understand that if a plant is entirely driven by steam and there is an excess exhaust steam going to the atmosphere, then a portion of the plant should be driven by motor and a condenser engine used. In other words, bring down the engine capacity as far as noncondensing engines are concerned to about the drying and heating requirements of the mill. Of course there are rare instances where there is a sulphite mill and an enormous quantity of steam is used that does not come back in form of condensate and the same mill has a surplus of exhaust steam; then it is possible that a heater might be advisable but only a heater of ample capacity to heat the make-up water; further, I don't consider the heater should be large enough to handle all the condensate from the mill. In other words, condensate from the paper machine, heating system, etc., should be put directly into the boilers at the high temperature which it leaves the paper machine, and further, should not be allowed to be returned to a feed water heater and cooled down to a temperature equivalent to the atmospheric conditions usually found in the feed water heaters, or down to a temperature of about 200 degrees.

The water may be leaving the paper machine at 240 degrees or on board machine where 40 pounds are carried the temperature of the condensate is about 280 degrees, or, in other words, the temperature of the condensate leaving the dryers in the paper machine is not more than 5 degrees less than the temperature of steam itself due to the pressure carried in the dryers.

Keep Oil Out of Dryers

I find mills with not enough oil separation on their engines thus allowing oil to get into the paper machine dryers. Oil is a great non-conductor of heat and should not be allowed to find its way into the paper machine dryers.

Meter your condensate from your dryers as very often great wastes can be stopped. There is no better way to arrive at the consumption of steam per pound of paper dried than to weigh your condensate. I have developed a machine that will meter the condensation under pressure and at high temperatures accurately. What does this mean to the mill in the saving of fuel? It shows at once if you are using more steam today than yesterday. An immediate check can be made and the following are a few things that will alter the consumption of steam per pound of paper dried from day to day, or I might say almost from hour to hour. Slowness and freeness of stock; press rolls; felts; wires; condition of air in machine room; oil in dryer; leaking steam traps if they are being used, and a number of other things that can be found when you are using meters to check the steam consumption.

I find a great many mills allowing their condensate from their paper machine dryers to discharge into the heater and allowed to cool down for the reason that they lack knowledge of apparatus that will handle the condensate at a high temperature and feed it directly back into the boilers.

I find many mills using a vacuum pump and they seem to have the impression that this vacuum pump is pulling a vacuum on the dryers and yet they can see plainly by the gauge that the dryers have pressure on them. In other words, how could dryers have a pressure and a vacuum at the same time, it is not possible to obtain a vacuum on a vacuum pump unless the vacuum pump has something to pull against, therefore, usually small traps on the dryer or trap draining the header so that the vacuum pump can pull against the valves of these traps. I mention this to explain that if there was one pound pressure in the dryer just one pound pressure would push the water out of the traps at a speed about ten times faster than a vacuum pump could possibly pull it out. In other words, I have actually seen a pressure of 70 pounds on dryer with small traps and a vacuum of ten inches on the vacuum pump draining the trap. I will describe the waste of this method.

First of all, if one of the traps would be leaking then live steam is going through to the vacuum pump, if one of these traps should be clogged then that particular dryer is not drying and further the temperature of the condensate at 70 pounds pressure on the dryer is over 300 degrees and with ten inches of vacuum this condensate has to be cooled down with cold water above from 300 to 170 degrees or a 130 B. T. U. lost in every pound of water. Figuring about three pounds of steam per pound of paper in 24 hours the figures in B. T. U. losses would look something like a Liberty Loan. I have seen

De Laval 8-in. pulp pump handling 1350 gal. per min. of 1 per cent stock against 50 ft. head at plant of the Howard Smith Paper Co., Toronto.

De Laval High Efficiency Open Impeller Pump

THE OPEN type impeller used in the De Laval pulp pump for handling wood pulp, rags and waste is free from clogging under adverse conditions, as the knife-like sides of the blades, running close to the removable side plates, shear and cut stringy material. The pump shaft is protected from strings, rags, etc., wrapping around it by stationary sleeves and it is also encased in bronze sleeves which extend from the impeller out through the packing glands.

Impeller and wearing rings of De Laval special pulp pump

The pump operates at standard motor and turbine speeds. In a recent test on an 8-in. pump driven by a synchronous motor, an efficiency of 64% from wire to water was demonstrated, while a 10-in. pump showed a similar efficiency of 66%. All parts are made to limit gages on an interchangeable basis, and each pump is guaranteed as to efficiency and other characteristics, and is tested before shipment.

Ask for special pulp pump leaflet No. 82

De Laval

Steam Turbine Company

Trenton, New Jersey

Local Offices:

Boston, New York, Philadelphia, Pittsburgh, Indianapolis, Chicago, Cleveland, Duluth, Kansas City, Denver, Salt Lake City, Charlotte, Atlanta, Birmingham, New Orleans, Dallas, Seattle, San Francisco, Los Angeles, Montreal, Toronto. 267

Oxford Paper Company

Mills at
RUMFORD
MAINE

Executive Offices
200 Fifth Avenue
NEW YORK

Manufacturers of

High Grade Machine Finish and Super-Calendered Book, Lithograph, Envelope and Tablet Papers

and

"Polar," "Hi-Tone" and "North Star" Coated Book Papers; also Coated One or Two-side Lithograph and Cover

Capacity of Mills: 350 tons of Paper, 150 tons of Soda Pulp, 100 tons of Sulphite Pulp per day

many paper machines with ten pounds pressure and a vacuum of ten inches and the condensate leaving the dryer is about 235 and has to be cooled down to about 170 degrees with a direct loss of 65 heat units in every pound of water.

If the return line leading to the vacuum pump was opened up and discharged to the atmosphere, you would not only get higher temperature to your feed pump but even better circulation from the small traps. Further, the drying capacity in the dryers is retarded as water must accumulate in the bottom of the dryers to cover the syphon pipe before it can discharge from the bottom of the dryers. With a syphon pipe one inch away from the dryer, one inch of water must accumulate and one inch of water in the dryer with the revolving process of the dryer will cover at least 25 per cent of the dryer with water which reduces your drying capacity and no air can escape.

Now try disconnecting the return pipe of a dryer from the return header and allow the water to blow out through the window and with all the steam that will blow with it and you will find that dryer hotter than any other and there could be no air or water, as with one pound pressure on the dryer, the speed out through the syphon pipe is from one to three miles per minute which causes a high suction that sucks all the water off the surface of the dryers, and a high circulation of steam is set up in the dryers making the dryers the same temperature all the way across the face.

Steam Need Not Be Wasted

While you may say that you could not afford to waste this steam to get the circulation, it need not be wasted to get this blow as it can be blown into the next dryers and used over again as I will describe later.

I find a great many mills with one long steam header and one long return header drained by a trap. What are the bad conditions in a system like this, which is probably the oldest method of drying paper? First poor quality of paper because the dryers at the wet end are just as hot as the dryers at the dry end and the paper is dried too rapidly at the wet end. Second, the steam enters the dryers and fills them, then passes out through the syphon pipes and fills up the return header and everything stands dead, no circulation of steam in the dryers, dryers accumulate air and necessarily must accumulate water on the bottom of the dryer until such times as the syphon pipe is covered and if the syphon pipe is one inch away from the dryers, there is surely one inch of water on the surface of the dryer; the result that probably 25 per cent of the dryer is covered with water.

Then suddenly several of these dryers discharge water out into the return header so that there is a slug of water leaving the dryers. They then become a little hotter so that the operator shuts off a little steam, then after he has shut off steam, water begins to accumulate in the dryers and they begin to get cooler and he has to turn on steam again with a very fluctuating temperature in the dryer and a great loss in drying capacity as a result; further, the fluctuation of the moisture content in the sheet.

I find other mills that have divided their dryers into sections and are draining each section with a trap, in this condition the section of the dryers remain the same as I have just described heretofore—fluctuation of temperature, poor drying conditions and an opportunity for accumulation of air and water in the river.

I find other mills that are greatly interested in maximum production that have opened up their return header and are allowing their steam to blow right through out of their hot well and sacrificing their coal pile for maximum production. In this condition the dryer nearest to the outlet to the hot well will be hotter because there is a short circuit right through the dryer nearest to this outlet. This provides a very poor drying condition, further if there is not exhaust steam enough and live steam is necessary to provide maximum temperature for the dryers, there is an opportunity for live steam to blow right through to waste. This I find in many mills while the owner is usually loth to admit it, nevertheless it is a fact. Further I have found that some mills who have tried to copy some system or to carry out some of the ideas that have been published from time to time have gotten into trouble because they didn't understand the fine points of the system and equipment and condemned the system because they didn't understand its fundamentals.

I will not attempt to say that I have been able to develop a drying system in the short period of four years that will meet with all the requirements, without having had some difficulties and experimental work.

What a Good Drying System Means

I will now illustrate what a good drying system means to the paper mill, in my opinion, it means that more paper can be dried because the dryers will be hotter and if the dryers are hotter, it is because they are free of air and water.

Paper Machinery and Equipment at Old Hickory Powder Plant Now Released for Immediate Disposal

24—Mammoth Jr. Jordan Engines. Maker Noble & Wood Co. Shell 5′ 6″ long, with 10-inch inlet and 6-inch outlet. Capacity, 30 tons per 24 hours. Will run either direction at 350-375 R. P. M. Fitted with steel bar knives, block and oak fillers.

40—Welded Steel Digesters, Maker Continental Iron Works. Capacity, 1300 cubic feet. Inside diameter, 8 feet. Length overall, 27 feet. Working pressure, 110 lbs. per square inch. Tested 165 lbs. per square inch. Each digester complete with cast iron supporting ring, cast iron false bottom, hoppers, guides, and all accessories.

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SIZE	CAPACITY
12 ft. 6 in. x 11 ft.	15,150 gal.
12 ft. 6 in. x 18 ft.	16,680 gal.

1500—Steel Tanks—capacities, 100 to 55,000 gallons.

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THE HYTOR VACUUM PUMP FOR FLAT BOX SERVICE

Vacuum Produced Absolutely Without Pulsation

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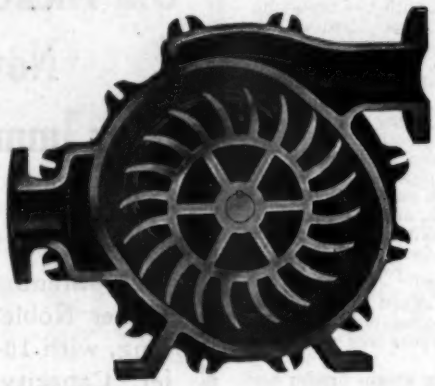

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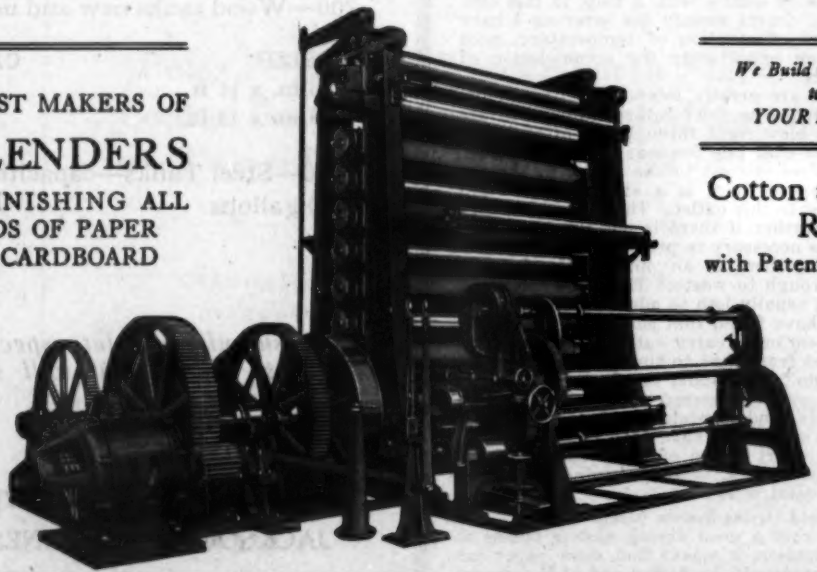


We Build Our Machinery to Meet YOUR Requirements

Cotton and Paper Rolls
with Patented Fastenings

When dryers are free of air and water they do not require temperature control devices because the temperature remains constant. In other words, why should the temperature in dryers fluctuate if there is no air or water?

Hotter dryers mean that the same amount of paper can be dried with less pressure of steam. Less pressure of steam means less back pressure on your engine. Less back pressure on your engine means that the engine consumes less steam. Less back pressure on the engine means that the engine will operate more smoothly, and with less variation in speed and, of course, more power. Less consumption of steam by the engine means less consumption of fuel.

I will go so far as to state that there is even a saving in power by the absolute elimination of water in dryers, because less water in the dryers means extra weight, hence more power to drive the paper machine.

Hotter dryers with the temperatures graduated mean that a better and tougher sheet of paper is dried, and a stop to shrinkage and cockels to a certain extent, and a better finish on the sheet.

Hotter dryers provide conditions where speed can be obtained and speed cannot be obtained until drying conditions are improved. Very often speed cannot be made without some method of reducing back pressure because usually to increase the speed, increased pressure is required and back pressure on the engine is increased.

When dryers are heated up more quickly on Monday morning and the drying conditions throughout the week are right, paper can be put over quicker so that considerable steam is saved; in many instances much more paper is made on Monday where the drying conditions are right.

Why is less steam used with a good drying system? I have mentioned many reasons here before but one of the principle reasons is that with a good drying system the condensate from the dryers is held under pressure and fed automatically into the boilers independent of the feed water heaters and boiler feed pumps, etc., so that it enters the boilers within a few degrees of the temperature at which it leaves the paper machine.

The theory that I have been working on for several years is to hold condensate under pressure; in other words, if condensate is held under pressure the sensible heat is retained which means a direct saving in fuel. For illustration, if fifty tons of newsprint were made per day and 28/10 pounds of steam per pound of paper were used this would mean two hundred and eighty thousand pounds of condensate taken from the dryers in 24 hours. If ten pounds pressure was required on the paper machine to dry this paper it would mean that the temperature of the condensate in the dryers would be at 235 degrees. With the old idea or method of taking the water from the paper machine and discharging it into your feed water heater and cooling it down to 200 degrees it would mean a loss of 35 degrees of B. T. U.'s in every pound of water or practically to million B. T. U.'s lost per day. I do not need to illustrate how many pounds of coal this would save but don't forget that there are only so many B. T. U's. per pound of coal. Don't forget that these heat units are absolutely in the water, all ready heated and do not require any coal to heat them up. Therefore, why should this condensate be allowed to get out from under pressure and be discharged into a low pressure heater hot well or some other device where it will be cooled down and then put into the boiler and heated up again? When with a very simple arrangement the condensate can be taken direct from the paper machine into the boiler. Whereon this condensate can be removed from the dryers and fed into the boilers with 75 per cent less steam or energy than any other known type of pump.

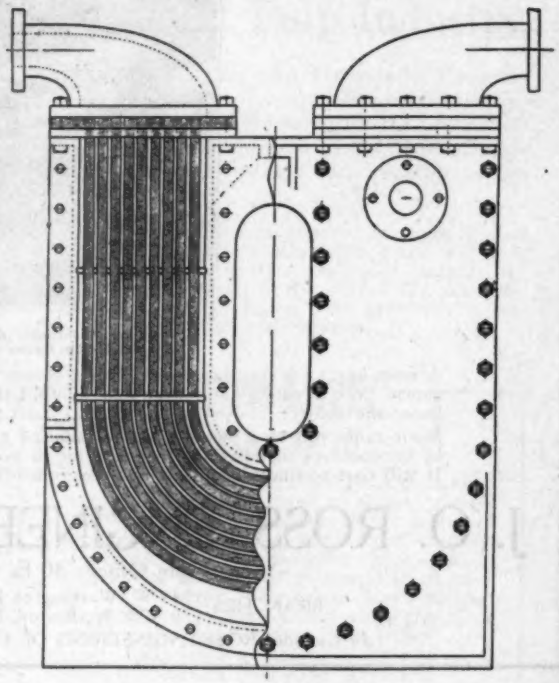
By closing up the return line and holding the condensate under pressure from the paper machine and heating system, high presure traps, etc., we are in many instances able to get higher temperature feed water into the boilers than can be obtained by the use of economizers.

I have outlined many wastes and many ways that these wastes can be stopped. To allow wasteful conditions to continue in the paper mill is a sure way of making competition hard when competing against the new and up to date mills that are being erected and that are employing modern methods.

There will be a meeting of the Western Board Division of the American Pulp and Paper Mill Superintendents' Association held at the Congress Hotel, Chicago, May 12. Kenneth T. King, of E. I. Du Pont de Nemours and Company will discuss "Colors" and John O. Woodsome will talk on "Drying of Paper."

The Chicago office of Wilson Goggles, Inc., Reading, Pa., finding it necessary to enlarge, has been moved to 127 North Dearborn Street.

The WOLF COOLER



THE WOLF RELIEF COOLER for reclaiming relief gases from digesters employed in the production of sulphite pulp.

The Wolf Relief Cooler for the efficient recovery of waste gases incident to cooking sulphite pulp and permitting the use of water warmed in the process of cooling for washing purposes.

Chip Screens—Woods Ideal Chip Separator—The Ryther Shredder for the primary reduction of dry, partly dry and partly frozen ground wood and chemical fibre laps, sheets and boards preliminary to bleaching, beating or mixing.

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Would You Call Us In to Help You Make a Sheet of Paper? Yet We Have Seen a Lot of Paper Mills!

Vapor Absorption System on Book Machine
P. H. Glatfelter Co., Spring Grove, Pa.

A man has to devote his entire efforts to one subject in order to master it. You do this in making paper. We devote all our time and thought to heating and ventilating paper mills. We ought to know the subject, and we think we do. Last year eighty mills thought so too.

Some mills still treat heating and ventilating as something anyone can do. The experience gained in hundreds of installations means a lot to you in economy in first cost and operating costs. It will cost you nothing to get our recommendations on any heating, ventilating or drying proposition.

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HAMILTON, OHIO

Builders*—Paper and Pulp Mill Machinery—*for

INCREASED PRODUCTION **SERVICE ALWAYS**

Kalamazoo Valley

Kalamazoo, Mich., May 1, 1923.

Another New Mill Near Kalamazoo

A new development in the paper industry of the Kalamazoo River Valley is the establishment of a new mill at Howlandsburg, an old flour mill site about three miles north of Galesburg, Mich. Articles of incorporation have been filed with the secretary of state, under the name of The El-Nora Lee Paper Company, with an authorized capital of $600,000, the purpose given as the manufacture of kraft and book papers.

The incorporators are Irving Hopper, formerly general superintendent of the Kalamazoo Stationery Company; his wife, Elnora Lee Hopper, and R. C. Goembel, a Kalamazoo attorney. Mr. Hopper is well known to the paper trade men of Kalamazoo and those whose connections brought them in contact with this leading business man of the city.

Mr. Goembel, attorney for the company, has stated that the company's establishment has received hearty support among paper men, $300,000 of the total capital already having been paid in cash and property.

The site chosen is exceptionally well adapted for the mill. The land owned by the new corporation covers about 55 acres, with a pond site of 45 acres. On the property are several buildings, including the flour mill, which will be available for use by the concern as soon as production is started.

The water power at the location is a big asset, 300 horsepower having been developed in tests made recently. This, it is predicted by experts on the job, will be capable of development to 900 horsepower when improvements are made.

In regard to the production, it is noted that there is no kraft mill in the Kalamazoo valley. This addition will therefore enhance the already varied lines of production in that vicinity. The mill structure that is standing at Howlandsburg, according to officials of the company, is admirably suited to the making of kraft paper, with a few adjustments. In addition to the installing of a paper machine and equipment, the immediate plans of the company include the erection of a filter plant.

Howlandsburg is off the main line of the Michigan Central and Michigan Railway (electric), both of which touch at Galesburg, the nearest point to the mill site. A branch of the Michigan Railway runs to Yorkville, on Gull Lake, which, being nearer to the site, may make it feasible to run in a spur from that line to Howlandsburg. The project of trucking the product to Galesburg and Kalamazoo is also being considered. Recent rumors have it that the Michigan Central is not averse to building a spur off the main line south of the property to handle the company's shipping as a result of recent conferences between officers of the company and representatives of the road.

Meeting of Michigan Superintendents

The Michigan Division of the American Pulp and Paper Mill Superintendents' Association held its regular monthly meeting following a very enjoyable supper at the Park American Hotel, Kalamazoo, on April 19.

As is typical of the frequent meetings held by the Michigan superintendents, the spirit of the meeting leaned toward the weightier things in a superintendent's life rather than the lighter and more frivolous by which so many similar gatherings are identified.

Following the dinner the meeting took on a decided academic aspect, and well it might, since the three speakers of the evening were connected with institutions of higher learning. Chairman Brisbois, after calling the meeting together, explained that this was to be a slight variation from the usual meeting where the members listen to the discussion of some specific phase of the industry. Professor A. W. White, Director of the Department of Engineering Research of the University of Michigan, was the first speaker introduced.

Professor White's talk was largely prefatory to the actual presentation of a plan by Professor R. A. Hayward. In his talk, Professor White mentioned company after company—all large, nationally known manufacturing concerns—which do, and have for many years picked the men to fill their important positions from the colleges and Universities of the nation. He showed that the great strides of progress taken by many of our industries were made by these same university men applying the fundamentals of science. We owe much to science. By means of intelligent research, science has carried the industries of this country from its recent primitive crudeness to its present state of refinement and efficiency. We have, however, taken this development too much as a matter of course. We must realize that progress will not go on if we stop.

Professor White next called to mind the fact that Michigan has long been one of the leading states in the matter of prac-

Announcement

to the

Paper and Pulp Industry

Bitumastic Solution and Hermastic Enamels have for a number of years been used satisfactorily in numerous industries, for the protection of metal surfaces coming in contact with atmospheric conditions which are conducive to corrosion.

So busy have we been supplying the demands of other industries that, until recently when paper and pulp mills began to make inquiry about our coatings, we have somewhat neglected this field. We are now, however, prepared to discuss your problems of corrosion and their possible elimination.

BITUMASTIC

WHAT IT IS

This material is a black, Bituminous composition, which has been found to be very satisfactory when subjected to moisture such as condensed steam, acid fumes and vapors. Used on hot steam pipes, boiler fronts, smoke stacks, and all kinds of structural steel surfaces, air ducts, ventilating fans, tanks, digesters and all such places where the corrosive conditions are severe and where constant repainting is necessary in order to preserve the surfaces from rapid corrosion.

It is applied the same as ordinary paint; dries quite hard in five hours; gives a lasting, brilliant black finish. It costs about fifty per cent less than a good lead and oil paint.

HERMASTIC

WHAT IT IS

This material is used quite generally in industrial plants for lining steel coal bunkers and ash hoppers, where, as every engineer knows, corrosion is very rapid.

It is applied in the following manner: The surface of the steel is thoroughly cleaned and dried and a priming coat of W. D. H. Priming Solution is applied cold like ordinary paint. This is allowed to set for about five hours after which the Hermastic Enamel is applied by means of Special Tampico fibre daubers, while in a hot molten condition. It leaves a coating on the steel of about 1/8" thickness and insures lasting protection to the inside of the coal bunkers. Due to its very high melting point it neither sags under extreme heat nor cracks under extreme cold.

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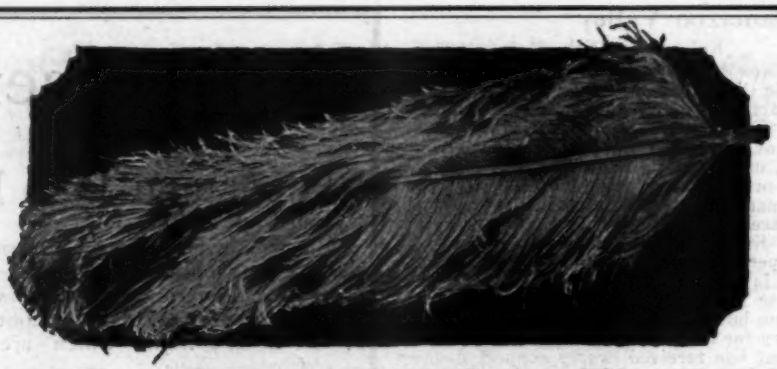

THAT "FEATHERY" EDGE!

IN THE language of the paper maker, a "feathery edge" is an indication of excessive leakage of pulp under the deckle strap.

Paper mill superintendents who want to produce a maximum of finished paper, have no use for a feathery edge—it means lost production and reduced profits—it weakens the sheet and causes it to tear.

A Fourdrinier Wire with a slack edge cannot help but make paper with a feathery edge, and no one thing can do more to eliminate this difficulty than the selection of uniform, straight-running Fourdrinier Wires to which deckle straps can hug tightly every inch of the way.

Weaving wires that have a minimum tendency to become slack at the edges is the aim and accomplishment of The W. S. Tyler Company. Tyler Fourdrinier Wires are woven on looms especially designed and built by us.

Samples submitted upon request

The **W. S. TYLER COMPANY,** *Cleveland, Ohio*

BARRE GRANITE IN PRESS ROLLS

Is Revolutionizing the Whole Paper Making Industry

If your Paper Machines are not equipped with Press Rolls of BARRE GRANITE you are not getting the results that you should get, for it is a recognized fact that granite rolls are much superior to any others and Barre Granite the best of all. Let us tell you about them.

Jones Brothers Company

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tical education. He then emphasized the fact that we had a great deal of competition and in order to retain our present scholastic leadership we must link this education more closely to the industries of the state. The University of Michigan now has plans for the erection of a new engineering research building and the industries of the state are being offered co-operative use of this building. This will include laboratory facilities and a large engineering staff. There will also be available to the industries the university's library, which, Professor White claimed, is the seventh largest in the country.

Dr. Allen Hoben, president of the Kalamazoo College, was next on the program. His talk was brief and very much to the point. He announced that if the plans as presented by the University of Michigan were accepted by the paper industry of Michigan that the Kalamazoo College would co-operate and work directly with the U. of M. in this movement to link more closely the educational institutions and the industries of the state. He mentioned the advantageous location of the Kalamazoo College, being right in the heart of one of the world's greatest paper making centers.

Dr. Hoben was very firm in his belief that if the paper industry didn't realize the value of and make more use of the efforts of the schools that it would not be long until it would fall behind in the world of commerce. In order to keep up with the other industries the paper industries must carry on more intelligent research.

The last speaker of the evening was Professor R. A. Hayward, of the University of Michigan. He it is who will have charge of the paper mill research work if the plans of the university mature. Professor Hayward's presentation of the plan is given in part as follows:

Possible Service Organization

"Due to a recent ruling of the Board of Regents it is now possible to have a central engineering service and research organization for the superintendents of the paper mlils in Michigan. This organization can render assistance along several different lines. The first type of service can be classed as engineering service. Under this division would come departmental investigations which would measure the exact facts so that it would be possible to show in dollars and cents the loss that exists and it would also include technical plans and recommendations for reducing these losses, showing the cost of equipment and the amount of saving. With this information the superintendent can determine whether or not he wishes to recommend any alterations and can be reasonably sure of the results of any changes that he recommends. The engineering department would also collect data on all the kinds of paper mill equipment in use so that a superintendent would have available more of the facts relating to the machines than he now has. This would include the cost of equipment, the power required to operate, the capacity of the machines and the general results that are accomplished.

"It is also possible to have a complete chemical laboratory in which all of the tests, both physical and chemical, can be made on the finished product as well as on all of the raw materials which enter into the process. By being able to carry out all these tests the superintendent can more accurately establish the quality of his product. Whereby a broader basis of comparison of his paper with that manufactured by other companies is available; he can also more establish the quality of samples which he is required to match.

"Under the chemical department, research work can be carried on, on any problem and the facts can be developed which will show whether or not the process has a commercial value. To assist in this research work the university has available one of the most complete technical libraries in the country, it also has available specially trained men on all of the various scientific subjects which can be called into consultation on any special problems. The University is offering this service purely with the desire to render assistance to the industry so that they can raise their standard of production. The University also feels that this work will interest more of its students in the manufacturing of paper which will give a larger supply of trained men to the industry in the future."

Following this last talk, Chairman Brisbois expressed himself as being very much in favor of the plan and asked for the various members to express their opinions thereon. The discussion which followed was but a supplement to the enthusiasm already aroused by the speakers. It was the consensus of opinion that the university and the college could do much to raise the standard of paper making and cut down the many losses. One of the members went so far as to voice an opinion that there was not a department in the mill where there was not a loss. And the statement that the college man should make a better paper maker was not disputed.

A committee composed of Ed Coughlin, Mike Redmond, E. H. Gilman, Jacob Parent, and L. W. Simpson were ap-

Cleveland
WORM GEAR
REDUCTION UNITS

Cleveland Worm Gear Reduction Unit applied to bucket elevator. Motor 10 H.P. at 720 R.P.M. Ratio in worm drive 22½ to 1.

Shopmen like them

Men in the shop like Cleveland Worm Gear Speed Reduction Units.

They like them because they don't have to be constantly inspected and checked to keep them in service.

There are no adjustments to make. They are completely enclosed and run in an oil bath—are dustproof—show very little wear—and are safer.

Take up less space, run with greater quietness and deliver highest efficiency.

Get a "Cleveland" in your shop and see how it is appreciated. Make one installation and we'll take our chances on the future.

Our engineers are always ready to assist in suggesting correct installations. Write and tell us the service you have in mind and we will send complete information.

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America's Worm Gear Specialists

CLEVELAND, OHIO

TRADE **TISCO** MARK
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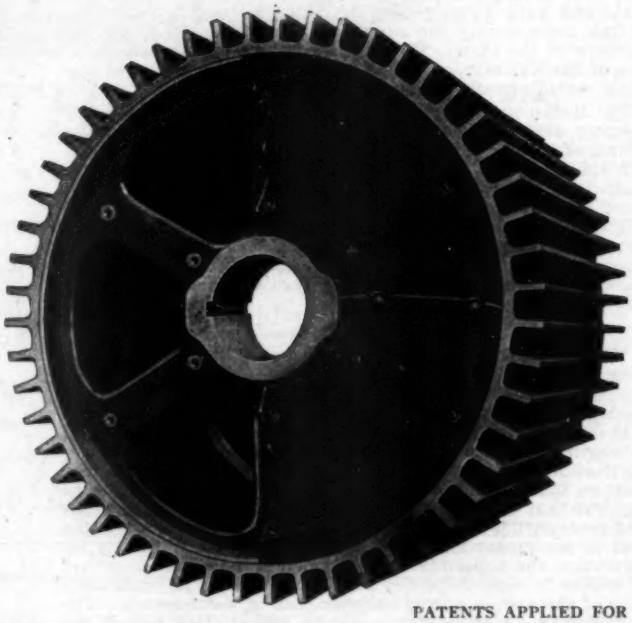
MANGANESE STEEL

ONE PIECE BEATER ROLL

No Separate Fly Bars
No Mechanical Holding Devices
No Wood Filling



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BLADES—

Cannot become loose—because they are an integral part of the roll.

They do not break—because Tisco Manganese Steel is tough.

They wear a long time—because Tisco Manganese Steel resists abrasion better than any known metal.

TISCO MANGANESE STEEL Jordan Fillings are cast in one piece—no separate fly bars to tear out and no wood filling to swell and cause trouble. Our plugs can be run at much higher speeds than would be possible with other types.

All beater rolls and Jordan fillings are machine ground true to size before shipment and are ready to install and operate without grinding in at the mill.

MADE TO FIT ANY JORDAN—ECONOMY GUARANTEED

Founded in 1742

Taylor Wharton Iron & Steel Co., High Bridge, N. J.

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201 Devonshire St., Boston

pointed to meet with Professors White and Hayward the following morning, at which time the following resolutions were drawn up:

Resolutions Passed by the Michigan Section of the American Pulp and Paper Mill Superintendants' Association
Kalamazoo, Michigan, April 19, 1923

WHEREAS, we believe that increased engineering and research service would be valuable to the paper industry in this State, and

WHEREAS, the University of Michigan and Kalamazoo College have indicated their willingness to co-operate, and

WHEREAS, by such co-operation it will be possible to provide the plant operating departments with engineering service by procuring for them the data they desire for changes in processes and new equipment and by providing them with carefully prepared plant flow sheets, power house studies, et cetera, and utilizing this information to effect plant economies, and

WHEREAS, by a co operative organization it will be possible to have a fully equipped chemical laboratory in which all physical and chemical tests can be made on the finished product as well as on the raw materials that enter into the manufacturing process, and

WHEREAS, an organization will be available for special research work for any process or problem, and that this organization will have available the entire technical libraries and laboratories of the University of Michigan and Kalamazoo College, and

WHEREAS, the work set forth because of the size of most of the plants is not practicable for many of them to carry it on independently, and

WHEREAS, we believe this work should in no sense be construed as replacing present technical work now engaged in by companies; but rather as an amplification of it, and

WHEREAS, we believe that with the establishment of this co-operation an increased number of properly trained technical men will enter the paper industry,

BE IT RESOLVED, that we, the Michigan Section of the American Pulp and Paper Mill Superintendent' Association, do feel that this proposed service will be of material assistance in helping us to effectively carry on our work and do heartily endorse the proposed co-operation with the University of Michigan and Kalamazoo College, and recommend that the managers and Boards of Directors of the paper companies in this state make possible and effective this co-operation.

Those Present Were

A. E. Camp, Michigan Paper Company, Plainwell; H. J. Gebhardt, Chicago; A. W. White and R. A. Hayward, University of Michigan, Ann Arbor; C. A. Thorne, Watervliet Paper Company, Watervliet; L. W. Simpson, Jake Kuss, Albert Lindner, Ed Coughlin and Geo. Pountain, all of the Allied Mills; Jacob Parent, Western Board Paper Co.; Mike Redmond, of the Kalamazoo Paper Company; A. G. Wightman, Hawthorn Paper Company; C. L. Harter, Rex Paper Company; E. H. Gilman, Bryant Paper Company; Allen Hoben, Kalamazoo College; N. M. Brisbois, Southerland Paper Company; Howard P. Hall; Oliver Buswell, Paper Industry, Chicago.

Joint Meeting of Executives and Superintendents

A joint meeting of the paper mill executives' and superintendents' associations was held on Tuesday, April 24th, at the Park-American Hotel, Kalamazoo, Mich., at which time Professors White and Hayward, of the University of Michigan, and President Hoben, of the Kalamazoo College, outlined plans for research and engineering work to be carried on by the two schools in the paper mills.

After a somewhat lengthy presentation of the plans as proposed by the University of Michigan it became evident that these plans as presented, conflicted in a measure with work which the Kalamazoo College has been developing for the past five months. While the members of the meeting were assured by the representatives of the University that it would in no way conflict or replace it, it was not made clear to the majority of those present just how the institutions would co-operate. In view of this lack of understanding, all but one or two of the attending executives favored going ahead with the proposition made by the Kalamazoo College. It did not seem to be the wish of the mills represented that the proposition made by the university should be carried in and over the work already done by the Kalamazoo college. While no official action was taken to that effect, it was, moreover, recommended that they present their service as a separate and non-conflicting service to the individual boards of directors or else determine a definite basis on which the two schools may co-operate.

In spite of the fact that practically all the mills of the valley

SIMONDS
Machine Knives
FOR
Paper and Pulp Mills

Highest Quality—Finest Steel—More Production

Write for Catalog and prices

SIMONDS SAW AND STEEL CO.
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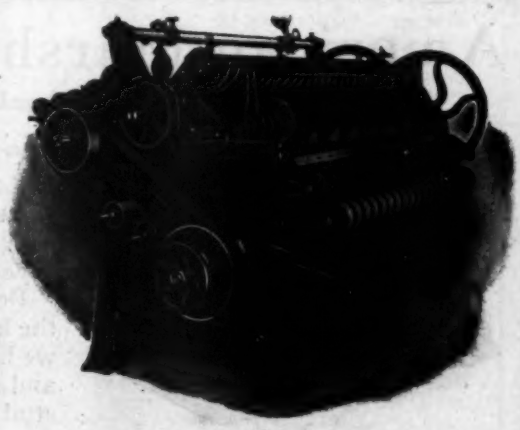

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Single, Duplex, and Diagonal

CUTTER KNIVES
PATENT TOP SLITTERS

Hamblet Machine Co.
LAWRENCE, MASS.

The Most Satisfactory Portable Elevator You Can Buy

Reversible flat and roller platform
Lever for raising and lowering top section
Quick speed lowering device
Automatic brake
Ability to lower on hoisting spindle as well as quick speed
Cut Gears
Ball bearing wheels
Rugged construction throughout

Electric machines have regular hoist type motor, line switch, reversing controller, upper and lower limits, heavy silent chain drive.

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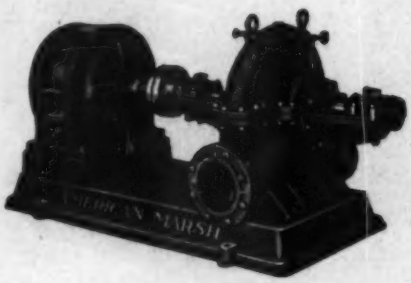
American-Marsh Paper Mill Pumps

Centrifugal and Direct Acting



ESPECIALLY adapted for paper mill service where absolute reliability and high efficiency are required. There is an American-Marsh pump for every paper mill requirement, from draining the rolls on the dryers to handling heavy paper pulp stock.

Because of the fact that the factory is located in the heart of the largest paper mill district in the world, we have always made a specialty of paper mill pumps and our designs are the result of careful first hand study of the actual requirements.

The line includes

Boiler Feed Pumps
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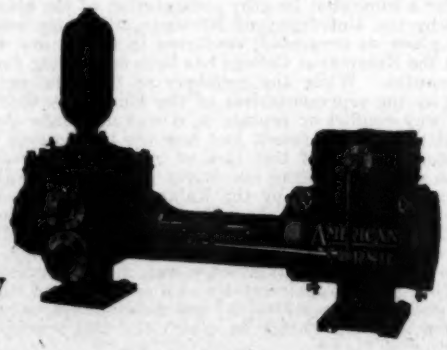

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American Steam Pump Company
Battle Creek, Michigan

were represented there was no official action taken in the matter.

Following these first overtures, Drs. Hoben, Griffiths and Thompson, president, and heads of the economics and physics departments, respectively, have issued for publication only the statement that some of the larger mills, appreciating the value of scientific research in their general and local problems, have appropriated various amounts of money, which, acting in conjunction with the other mills of the valley, will go to establishing a research laboratory at Kalamazoo College.

Kalamazoo College has long been active in industrial research in a general way, but the task of considering in particular the work of one branch of manufacturing, such as a Paper Research Laboratory would handle, has never before been brought before the officials of the institution. It is likely that further efforts at co-operation between the college and the mills will be made during the month of May.

New England

Boston, May 1, 1923.

Much Damage by Floods

At present, northern New England paper mills are faced with one of the worse spring floods recorded in a quarter century and some eight pulp and paper mills are down as a result and others have had their operations drastically curtailed.

Previous to the last week in April, New England rivers had been very low due to the drought of last fall. But starting April 26 a succession of terrific downpours occurred all over New England and eastern Canada. The remaining snow on the mountains was melted and the swollen rivers swept bridges and dams before them causing millions of dollars of damage. A huge boom of logs, being the entire drive of the American Realty Company at North Hartland, Vt., on the Connecticut River, broke away and at last reports was sweeping down to Holyoke, Mass., having thwarted several efforts to stop it further up the river. These logs were destined to the International Paper Company mill at Bellows Falls, Vt., where futile efforts to halt their course were made.

The Champion-International Paper Company at Lawrence, Mass., was forced to close as the Merrimack River began to flood the city. At Livermore Falls, Me., the grinder room of the International Paper Company is under water at the present time and the plant was forced to close. At Brunswick, Me., the Pejepscot Paper Company was forced to close parts of its mills due to the high waters. At Orono, Me., the International Paper Co. mill lost its pipe line to the ground wood and paper mills and its bridge over the river was also lost. Later, logs above, released by the breaking of a boom, were swept down and out to sea. The Ebemee Dam of the Howland Pulp & Paper Company, near Brownville, Me., which held back the waters of Ebemee pond, broke down and helped bring the Penobscot to the highest point in its recent history. The mills at Waterville, Scowhegan and Woodland, Me., were isolated by the floods as train tracks were flooded and it was impossible for several days to move raw materials in or finished paper out.

The rains have ended for the time being and most of the snow is now gone except from the high mountains so that fairly normal conditions may be expected to prevail in another week. In the meantime tremendous damage has been caused. To the paper mills the greatest loss will come in the thousands of cords of pulpwood that have been swept out to sea or left scattered for miles along the river banks.

Apart from the foregoing, conditions in New England are righting themselves. Due to the flood conditions, the Maine Central, Canadian Pacific, Boston & Maine and other roads have been forced to embargo a number of points, but this is temporary. Otherwise the railroad situation is decidedly improving though the New Haven Railroad, all things considered, is still the worse.

Annual Meeting American Pulp and Paper Mill Superintendents' Northeastern Division

The next meeting of the Northeastern Division of the American Pulp & Paper Mill Superintendents' Association will be held at Bangor, Me., Wednesday, May 23rd, at the Bangor house. There are two important reasons why all members are urged to make a special effort to attend this meeting. First it is the annual meeting of the Association which means the election of officers and the transaction of important business. Second, the program and entertainment committee, consisting of Messrs. Hackett, Somerville, Brautlecht and Harlow, have prepared a program which will equal, if not surpass, anything experienced to date.

The program of the day will be as follows:

11:30 A. M. to 1 P. M.: Business meeting election of officers.

1 P. M. to 2 P. M.: Lunch—Place optional.

From Car To Boiler Room For Five Cents

THAT'S what it costs to handle your coal with the Godfrey Conveyor — from five to seven cents a ton—depending on the distance carried, and it only takes an hour and a half to unload a fifty-ton car.

Just a glance at the accompanying photograph will show you how simple and yet how efficient is the operation of the Godfrey. The coal flows from the car, through a narrow steel track chute, into the conveyor bucket and is then transferred to bins, boiler room or outside storage. One man, stationed in the hoist house, controls the entire operation.

Whether your power plant is parallel with or at right angles to the railroad siding makes no difference. There is a Godfrey Conveyor to serve the requirements of every industrial firm, both large and small. Write for descriptive literature and prices.

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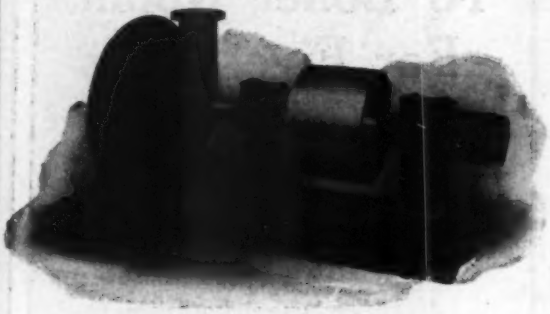
Elkhart, Indiana, U. S. A.

CENTRIFUGAL PUMPS

for



Water, Acid and Stock

Manufactured By

E. M. Cross Mach. Co.

BERLIN, N. H.

Aurora Centrifugal Pumps

Type OMD

Aurora pumps are made in many types, to meet all conditions found in the paper mill field.

We specialize in horizontally and vertically split open and inclosed impeller, single and multi-stage and deep well turbine centrifugal pumps as well as deep well reciprocating pumps.

A card from you stating your conditions places our engineers at your service and results in a saving to you.

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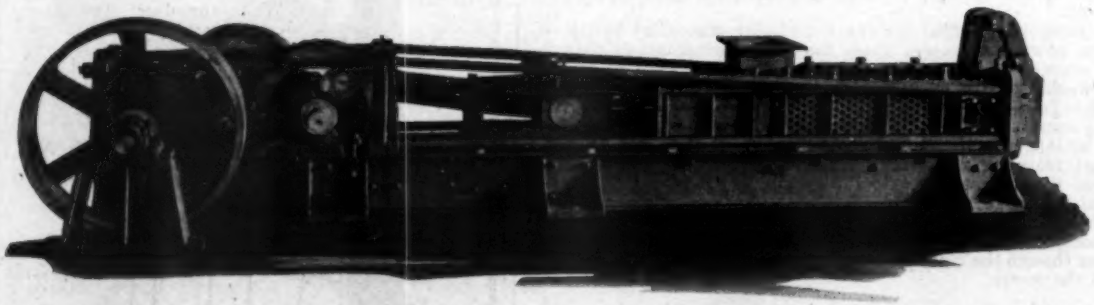
THE GIANT NEKOOSA BARK PRESS



This machine, driven by a 25 H. P. motor, presses wet spruce bark 52% bone dry, and wet hemlock bark 49% bone dry. This refuse is thereby turned into a good, usable fuel.

Nekoosa Motor & Machine Co.

Paper Mill Machinery, Iron, Brass and Sulphite Bronze Castings

NEKOOSA, WISCONSIN

2 P. M. to 6 P. M.: Visitation of mills—Eastern Manufacturing Company, Penobscot Chemical Fibre Company, and Orono Pulp and Paper Company. Automobiles will be furnished for transportation to various mills.

7 P. M.: Banquet—Orchestra and additional entertainment.

8:30 P. M.: Mr. Walter Rooney, of the Albany Felt Company, will deliver his illustrated lecture on the "Making of Felts" and "A Trip Through Japan." Mr. James A. Reilly, of the American Writing Paper Company, will talk on some feature in connection with costs. Secretary-treasurer B. T. Larrabee is enthusiastic regarding this meeting and his sentiment about it is justified judging from the above.

Though the record of some paper stocks in recent months has not been particularly pleasing to holders, there is one all New England concern which has a decidedly different record. International Paper and American Writing Paper are selling at about their low point for the year in New York. Not listed in any stock exchange but quoted by certain New England specialists Great Northern Paper Company stock is quoted at a 40 per cent advance since January. About the first of the year Great Northern was selling at 395 to 400. It was paying dividends at the rate of 24 per cent. A stock dividend of 200 per cent was declared so that holders have three new shares for one of old. The new stock selling around 180 and paying 10 per cent is the equivalent of 30 per cent on the old stock or represents a value of 540 for the old stock that sold at 400 January 1. This record is a high tribute to the quality of Great Northern Paper Company's management.

Charles Sumner Bird, president of Bird and Son, was threatened with death by a fanatic, owing to a letter he wrote to the daily newspapers of Boston on the subject of old age pensions. The headline writer in the newspaper misconstrued the text of the letter and headed it to the effect that Mr. Bird was opposed to old age pensions. This is not the truth. Mr. Bird has long advocated this reform but believes it should come through federal rather than state action. The Bird employes who grow old in the service are well taken care of.

Warren E. Sumner, with Bird & Son since 1903, died Monday, March 12, at Boston. Mr. Sumner was one of the best liked men in paper technical circles of New England. He was director of the Bird & Son chemical labortory in which so many of their products have originated and was in constant personal touch with Charles Sumner Bird, the company's president. He was a man of high character and a distinct credit to the industry. He leaves a wife and three children.

One of the largest timberland sales made by Maine owners for several years was transacted last month when 57,000 acres of timberland on the St. Croix River was sold by the James Murchie Lands Company to the Eastern Pulpwood Company of Calais, Me. The Eastern Pulpwood Company will occupy the Murchie office buildings in Calais, Me. Most of the land bought is in Washington county and has been cut during recent years by the St. Croix Paper Company, and the Eastern on stumpage rights.

Important additions and improvements costing $1,500,000 are to be made this season at the Oxford Paper Company at Rumford, Me. The Maine Coated Paper Company, a subsidiary of Oxford, will be turned into a three shift schedule plant employing 75 more men. Part of the money to be spent by Oxford Paper Company will be for a new paper machine and for a trestle for carrying wood pulp.

Raw materials were generally bearish during April. Waste papers broke sharply as did roofing rags, but though writing mill rags held firm there was little demand from the Berkstrees. The trade was interested to learn from local offices of the Great Northern Railroad that transcontinental freight rates on waste paper from the Pacific Coast had been materially reduced.

The Uncas Paper Board Company of Norwich, Conn., recently purchased by James E. Smith of Baltimore, has been gradually bringing its machinery to capacity production and with good luck expects to have all three machines running in May. With conditions favorable, 200 ton daily production is foreseen. The company intends to specialize in the future largely on folding box boards, including manilas and patent coated boards.

The Vermont Power & Paper Company, of Boston, with plant at Pownal, Vt., has been incorporated under Massa-

When You Think of Pipe Jobs Think of "TOLEDOS"

These two "Toledo" tools are particularly well adapted for use around the paper mill, for they will handle most of the larger piping jobs quickly, easily and right in position.

The No. 2 tool, shown above threads 2½ in. to 4 in. pipe, and the No. 250 pipe cutter, below, cuts off 2½ in. to 6 in. pipe.

Like all "Toledos" both tools may be operated by hand, anywhere the pipe is located or operated by the "Toledo" Power Drive, the electrical unit, converting the tools into the most efficient power equipment.

"Toledos" are made in various sizes to cut or thread any size of pipe up to 12 in. "Toledo" equipment can be relied upon to meet the most exacting requirements as thousands of owners will tell you.

A copy of complete catalogue will gladly be sent on request.

The "Toledo" Power Drive Makes "Toledos" Doubly Efficient

THE TOLEDO PIPE THREADING MACHINE CO. Toledo, O.

New York Office, 50 Church St.

Wood TANKS and VATS

All Kinds and Constructions for Every Purpose

Our Factory, Material, Service and Prices are to Your Advantage

E. F. SCHLICHTER CO.
10 S. 18th Street, Philadelphia, Pa.

Stevens Tank and Tower Co.

9-23 Center St. - - - - - - Auburn, Maine

Wooden Tanks, Tubs, and Vats

Wooden Penstocks, Acid Towers, etc.

Inbuilt strength and durability are features of all products manufactured by this company. Handy pocket size catalog mailed upon request.

Established 1893

A. D. COOK, Inc.

Lawrenceburg Indiana

FIG. NO. 30

Manufacturers of Deep Well Pumps, Working Barrels, Rods, Foot Valves, Strainers and a full line of Water Well Supplies.

The accompanying half tone shows the COOK Patent Brass Tube Well Strainer with Standard Fittings, which are Bail Plug in the bottom and Foot of Blank and Lead Packer on top.

When the COOK Strainer is properly selected for the water bearing sand, capacity and method of pumping, it will successfully deliver the maximum yield of the well for many years free from sand and the troubles incident thereto.

Write for Bulletin 30A

New Sand Filter

A SPECIAL filter for paper mills, producing all the results the paper manufacturer desires. It is a modification of the well known Hungerford filter adapted to paper mill use. It is constructed of concrete, strictly wrought iron pipe, brass strainers and especially prepared silica sand. It is as durable and efficient as can be built at any cost. It can be sold at a very low figure.

This filter gives perfectly clear water, washes thoroughly, does not require renewal of the sand bed, is absolutely reliable in the performance of its duty and requires a minimum amount of attention.

Send for full particulars

Hungerford & Terry, Inc.
CLAYTON, N. J.

WE-FU-GO AND SCAIFE WATER

PURIFICATION SYSTEMS
SOFTENING & FILTRATION
FOR BOILER FEED AND
ALL INDUSTRIAL USES

WM. B. SCAIFE & SONS CO., PITTSBURGH, PA.

chusetts laws with $250,000 capital. It gives its business as the dealing in and manufacturing of paper. The incorporators are Frank J. Barber, of North Adams, Mass.; George M. Faulkner, of Boston, J. Harry King, of Arlington, Albert Frederick, of Boston, and George O. Dudley, of Wellesley.

The Sulloway Mills of Franklin, New Hampshire, textile manufacturers, have purchased from the Innternational Paper Company, the old property known as Paper Mill C which has been idle for many years. The sale in no way affects the operating mills of the International at Franklin. It is understood that two-thirds of the dam are involved in the sale and power on the Winnipesaukee River.

The resignation of George L. Henderson as secretary and assistant treasurer of the Pejepscot Paper Company, of Brunswick, Me., took effect on May 1. Mr. Henderson has been with Pejepscot since April, 1921. He is leaving to take a position as vice president, treasurer and director of the Rye Trust Co., Rye, N. Y.

Contract has been awarded the Casper Ranger Construction Company of Holyoke, for the remodeling of the factory owned by the Chemical Paper Mfg. Co. of Holyoke at 642 Main Street. The remodeling will be in brick mill construction, and will cost about $20,000.

A rumor which has not yet been confirmed or denied relates to a combine to be affected between the mills of the Continental Paper and Bag Company at Rumford, and the International Paper Company plant, whereby the former would control the latter.

The Eaton Crane & Pike Company has elected Winthrop M. Crane and Harry D. Brigam, of Pittsfield, vice presidents. Mr. Crane is the new chief of the Crane Co. mills at Dalton and Westfield.

The $300,000 one and two-story building, 90 by 540 that is being built at East Walpole for Bird & Son is to house a big addition to the company's paper felt base floor covering plant.

Franklin E. Bragg, president of the Orono Pulp & Paper Company, has been elected president of the Bangor Chamber of Commerce.

Wisconsin News

Green Bay, Wis., May 1, 1923.

New Toilet Paper Mill

Green Bay is to have another addition to its already large paper manufacturing and converting industry, with the Straubel Machine Company entering the field manufacturing toilet paper with a specially designed interfolding machine just patented by L. A. Straubel, president of the company that bears his name. The company expects to start production by the middle of May.

The Straubel Machine Company, with its new equipment, expects to be able to convert paper at a great saving in time and labor. An interfolding machine folds, labels and counts the sheets of crepe or tissue paper. From this machine it is taken to the cutting machine, where cutters, electrically operated, cut the long lengths of labeled packages into 4½-inch lengths. These are then ready for packing and shipping.

The paper is fed into the interfolding machine from large jumbo rolls. The machine first perforates the paper, then it goes through another set of rollers which separate it sheet by sheet. It then drops down through a second set of rollers or plates into the folding machine, where it is folded and shot out on a large apron.

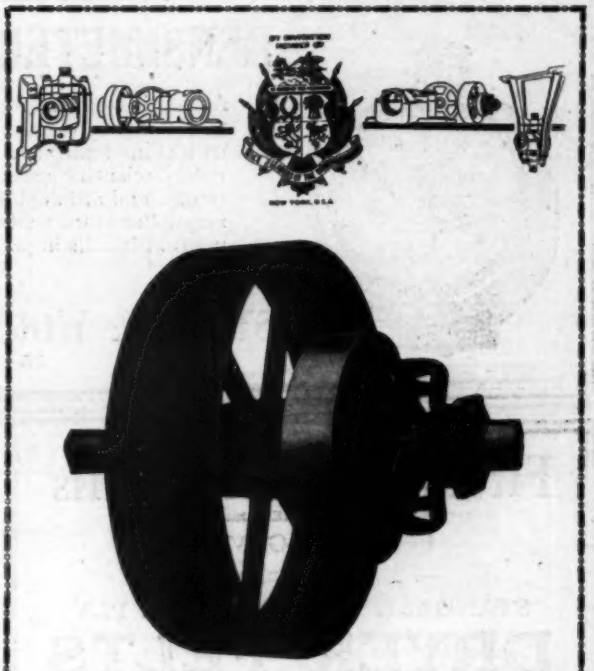
Here the machine operator, with the aid of the labeling machine, labels the package. The cutting machine has four pockets on a revolving axle that are fed into a series of sharp saws. It takes the pockets one minute to circle the axle. After being cut the packages automatically drop into a large basket ready for packing.

One departure is that the interfolding machine folds the paper twice, making three leaves. Most machines now in use fold the paper but once. This will make it easier to use it in cabinets, it is claimed.

The Straubel Company will also manufacture a simplified cabinet to be used as a container for folded toilet paper.

Two-Day Meeting Planned

Invitations have been extended to all paper mill owners and managers in Wisconsin, upper Michigan and Minnesota, comprising the Northwestern division of the American Pulp



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A Thoroughly High Grade Friction Clutch

The Universal Giant is a thoroughly modern, high-grade Friction Clutch—compact in form, unusually strong, easily applied and readily adjusted. It is complete within itself and does not require specially constructed appliances to be fitted to it.

Being made with an extended sleeve of standard diameter, an ordinary pulley, gear, rope sheave or sprocket of regular dimensions can be used by simply keying it on sleeve of clutch. It is only necessary that bore be the same as diameter of sleeve.

May we send you our catalog?

It contains some interesting and useful data on POWER TRANSMISSION APPLIANCES and the problems which beset the user.

T. B. WOOD'S SONS CO.

CHAMBERSBURG, PA.

POWER TRANSMITTING MACHINERY

DENSIMETER—A New Instrument for Paper Mills

A shop instrument for determining the density of rubber in accordance with a standard scale. Can be used in conjunction with a plastometer as its reading multiplied by two will give the plastometer reading. This is a rugged scientific instrument designed for use in the mill as well as the laboratory, and although it was primarily designed for testing rubber rolls, it may be used for testing any other rubber articles. It is suitable for testing rubber rolls in place in the machine in which they are used.

Send for Bulletin No. 124

STOWE & WOODWARD CO. The Rubber Roll Makers
Newton Upper Falls, Mass., U. S. A.

Fitchburg Duck Mills

ESTABLISHED 1844
FITCHBURG, MASS.
MANUFACTURERS OF
STANDARD AND MULTIPLE PLY
DRYER FELTS

English Weave in Two, Three, Four, Five and Six Ply—60 Inches to 176 Inches in Width

Fine Faced Felts for Fine Papers. Absolutely no felt marks in paper. TRIBUNE Three Ply Felts for Coarse Papers.

The "Hamilton" Felt

Our Cylinder Wet Felts for 9 points straw and for roofing are *open* in texture, *do not* stretch and *are durable*. A trial is invited.

SHULER & BENNINGHOFEN
HAMILTON, OHIO

LOCKPORT Felts

EXCLUSIVE MAKERS OF
Paper Makers' Felts

Have You Run Them?
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Are You Interested in Accurate Running Felts?

Give Us a Trial
Get Authentic Information
Ask the Men Who Run Them

Yours for service
LOCKPORT FELT CO., Newfane, N. Y.

THE WATERBURY FELT CO.

SKANEATELES FALLS
New York

FELTS and JACKETS

Top and Bottom Wet Felts for board machines, with all the qualities requisite to insure long life and continuous production.

They Satisfy

and Paper Mills Superintendents' Association to attend the annual convention to be held in Wisconsin Rapids on Friday and Saturday, May 18 and 19. All members of the Technical Association of the American Paper and Pulp Association also have been invited.

Included in the program of the convention will be visits to mills in this vicinity, including newsprint, wrapping paper, Kraft paper, tissue paper, hanging paper, board, sulphite pulp, sulphate pulp and groundwood pulp mills. Arrangements are being made for the entertainment of at least 150 leaders in the paper industry in the three states.

Trips will be made through the mills in Nekoosa, Port Edwards, Wisconsin Rapids, Byron, Plover, McDill and Stevens Point, part on Friday, the others on Saturday. On Friday night there will be a luncheon, business session and entertainment program in the Port Edwards auditorium. The main event is scheduled for Saturday at Wisconsin Rapids, when various papers on topics of interest to the paper industry will be read and discussed, followed by a banquet that evening in Wisconsin Rapids. During Saturday there will be entertainment at Stevens Point, when a great many of the visiting superintendents and their guests will be in that locality.

Officers of the Superintendents' Association are Len E. Smith, chairman; William Kelly, vice-chairman, and William Kraske, secretary.

Preliminary arrangements for the convention were made recently at a meeting of superintendents of the mills of this neighborhood. Committees have been appointed as follows:

Publicity—B. T. McBain, C. E. Jackson, M. T. Foster and C. K. Boyer.

Arrangements at Port Edwards and Nekoosa—O. L. LeRoux, B. H. Alexander and C. A. Youngchild.

Arrangements at Wisconsin Rapids—W. E. Beadle, George Wakely, A. J. NaDeau and J. R. Simpson.

Anderson W. Brown

Anderson W. Brown, president of the Rhinelander Paper Company and one of the best known men in the industry in Wisconsin, died here on Wednesday at the age of 74 years. With his brothers he founded the town of Rhinelander. Mr. Brown was born in New York state, the oldest son of Edward D. Brown, a pioneer of the Wisconsin valley. He spent his early days in Stevens Point and then with his brothers established a lumber business at what is now the city of Rhinelander. Besides being president of the Rhinelander Paper Company and head of Brown Brothers Lumber Company, he had many other business interests. He was chairman of the county board of supervisors of Oneida county many years and always took a keen interest in civic affairs, and was a leader in community development projects. He leaves a widow and two daughters and three sons, also three brothers and four sisters.

Changes Made at Both Plants of the Marinette & Menominee Paper Co., Marinette, Wisconsin

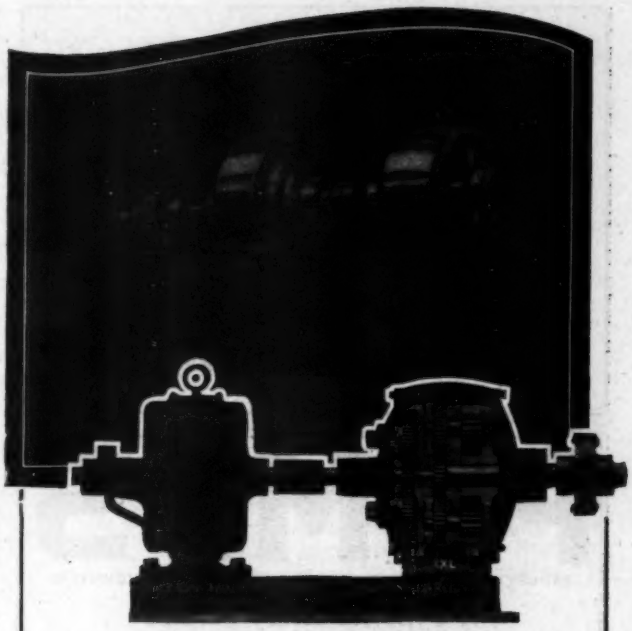
A crew of men under the direction of Contractor Ule of Stevens Point, began work this week on rebuilding the sulphite mill at the Menominee paper mill. He will have quite a few men and the job will not take longer than sixty to ninety days. The changes to be made will be similar to those made in the rebuilding of the Park mill, replacing wooden structures, etc., with concrete.

At the Park mills considerable new work has been done during the past twelve months. The mill is turning out about thirty tons of sulphite and about seventy-five tons of paper daily. This is about double the capacity in both departments that was maintained before the present company took over the plant. In the sulphite department a concrete addition 30x40 feet was built to the old sulphite mill and a new digestor added. This doubled the capacity.

The old warehouse of the plant was enlarged and two paper machines set up there. One of the machines was the one that was in paper mill No. 1 for many years. It was rebuilt and set up at the Park plant. It is now turning out about fifteen tons of paper daily. A Yankee machine was also set up in the former warehouse, and this is now operating. The other two original machines are running, making the Park mill a four machine plant.

The Park mills are now making their own size. This new department is housed in the north end of the former warehouse and tanks and other machinery are now being put in place there. Besides the size department an addition 100x60 of brick was built to the heater room and is used for storage purposes. An addition was also built to the machine shop and a massive new coal hoist erected. Other improvements made in the Park mills include:

New hot air plant throughout. Two new elevators one in the shipping room and the other in the storage room. Two new rope drives on the water wheels replacing the old shaft



A Foote Speed Reducer is directly connected to high speed motor and agitator in storage tank. Note the simplicity of installation and that Reducer is entirely protected against dirt, grit, etc.

Why the Foremost Engineers Choose Foote Speed Reducers

Five prime reasons determine engineers in their selection of Foote Speed Reducers.

First, Efficiency of service—Second, Economy of installation—Third, Low maintenance and long, dependable service—Fourth, Safety to workers—Fifth, Mechanical construction of the reducers.

Foote Speed Reducers deliver more motor power than other types of reduction drives. The reducers are direct connected between motor and agitator, conveyor, etc., thereby simplifying the installation with a resultant reduction in construction cost. High speed motors can be used, thereby creating a saving in the cost of motors.

All mechanism in the reducers is entirely enclosed and runs in oil, giving utmost efficiency and freedom from danger of explosion and fire. The design of Foote Speed Reducers is the last word in engineering. Foote Speed Reducers are the ideal drive for storage tanks, mixers, conveyors and other paper mill equipment.

Made in ratios of 5 to 1 up to 500 to 1 for motors of any horsepower.

CONSULT FOOTE ENGINEERS

Let us tell you about some of the many different applications for Foote Speed Reducers. Our Engineering Department is at your service without obligation. WRITE US TODAY.

Foote Bros. Gear & Machine Company

Mfrs. of Rawhide and Bakelite Pinions and Cut Gears of All Kinds. Send for Catalog. Special Machinery Made to Order. Submit Your Blueprints

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Knight & Knight, Underwood Building, San Francisco, Cal.

Pickles' Patent
Automatic Steam Regulator
FOR
Paper Making Machines

Which absolutely control the drying of the sheet. Installed on sixty days' trial

W. F. PICKLES **Buckland, Conn.**

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INDUSTRIAL—AGRICULTURAL—MUNICIPAL—RESIDENTIAL
A Type for Every Service
THE GOULDS MANUFACTURING COMPANY
SENECA FALLS, N. Y.
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Stickle Compound Condensing System
and Automatic Steam Control
for Paper Machines

As shown in the folder we sent out to the mills—"*How to Dry Paper*"—showing our Compound Condensing System for draining the dryers and heating the air with the discharge from the dryers to condition the machine room should interest you. We guarantee a saving of 20 per cent in steam consumed for this purpose.

Stickle Steam
Specialties Co.
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A complete line of
Power Transmission Machinery
FOR
BELT AND ROPE DRIVES
MANUFACTURED BY
THE FALLS CLUTCH & MACHINERY COMPANY
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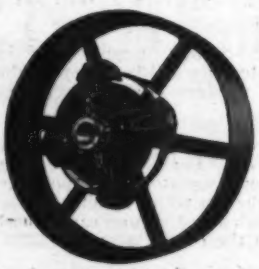
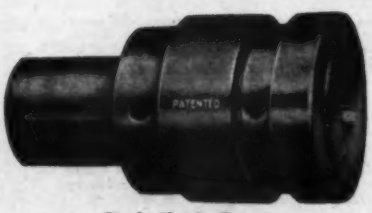

FALLS SOLID FRICTION CLUTCH PULLEY

THE JOHNSON FRICTION CLUTCH


Single Clutch—Exterior

Complies With All Insurance Regulations
Its exterior is perfectly smooth without protruding parts.
No clatter—No Bang.
All working parts enclosed against dirt and dust.

A Few Machines Used on:

Butter Churns
Bottle Fillers
Bottle Cappers
Soap Wrapping
Knitting
Dye Jiggers
Bottle Labelers
Tire Wrapping
Paper Cutter
Lathes
Screw Machines
Grinders
Drill Presses
Boring Mills
Millers
Tobacco Machinery
Cigarette Machinery
Folding Machine

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THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN

and gear drive—much smoother, less noise, and more economical in power. New concrete floors throughout the plant, replacing wooden floors, and several small concrete buildings to replace wooden structures.

A new auxiliary 500 K. W. engine to be used in case of shortage of water power. New boilers and considerable new machinery in wood pulp department and other departments. All this work has been done without closing down the mill.

The company expects to erect this year a new finishing room which will be built of brick and concrete and will be 150x40 feet in dimension. The new company since its coming to Marinette has not only increased the product of the mills but has increased the number of men employed and with favorable market and other conditions will continue to improve and add to the Marinette and Menominee plants.

Spring Meeting of Chemists

The spring meeting of the American Chemistry Society was held in New Haven, Conn., on April 3 to 7. Following are numerous abstracts of papers presented before the division of Cellulose Chemistry at this meeting.

A Study of the Rate of Penetration of Aqueous Solutes into Spruce Wood

By George A. Richter and C. W. Thing

Investigations of the chemical processes whereby wood substance is converted into paper pulp involve a study of the factors which influence the penetration of the chemical solution into the wood chips in question. To produce a fibrous pulp consisting of substantially stable cellulose, it is necessary to remove the undesirable ligneous constituent of the wood by a two-step process. The chemical solvent must first reach the ligneous cementing material by penetrating into the wood chip. The active ingredient of the cooling liquor then reacts chemically with the lignin rendering it soluble, thereby leaving a residue of liberated cellulose fibers. The work discussed in this paper relates to the first step in this digestion process, and confines itself wholly to the socalled sulphite pulp process.

A recent search through technical literature emphasized the absence of articles concerned with this rather important phase of the digestion procedure. The factors which should determine the character, size, and proportions of wood chips to be employed for optimum cooking conditions have been insufficiently investigated.

The authors were of necessity forced to formulate a program of limited scope. The present discussion is confined to experiments relating to the penetration of sulphite acids, sulphite salts, and miscellaneous typical solutes into spruce wood specimens.

The data and discussion are submitted in three main groups: (1) Diffusion data and discussion. (2) Penetration experiments by total submergence. (3) Typical cooking experiments.

1. Diffusion Data and Discussion:

A. Introduction:

1. Summary of the factors which would affect the rate of penetration:

(a) Variety of tree.
(b) Heartwood or sapwood.
(c) Moisture and air content.
(d) Irregularity of wood structure.

2. A table and curve are included which outline a new method for determining the approximate moisture content of wood.

B. Theoretical Discussion of Diffusion: A discussion of the diffusion equation together with calculations which are tabulated and plotted. These curves facilitate the determination of the diffusion constant.

C. Experimental Data: The rate of diffusion of various substances in white spruce wood is studied by two methods at 25 degrees C.

1. The time is determined for penetration through plugs of various thicknesses.

2. The amount of solute diffusing through plugs of one inch thickness for a given time interval is determined. An approximate diffusion constant of 0.1 is found for combined SO_2 and 1.0 to 2.0 for free SO_2 (best considered as equivalents diffusing per sq. in. per day per equivalent-per-liter per inch gradient).

The data may be further summarized:

1. Data is erratic. This may be explained by non-uniformity of wood and resulting uneven penetration.

2. It is shown that volatile solutes penetrate more quickly than non-volatile solutes.

3. Measurements under high pressures and at high temperatures were not made for reasons outlined in report.

D. An application of data is made to the average-sized

Made for maximum service not merely the average

TRADE JENKINS MARK

Jenkins Bros

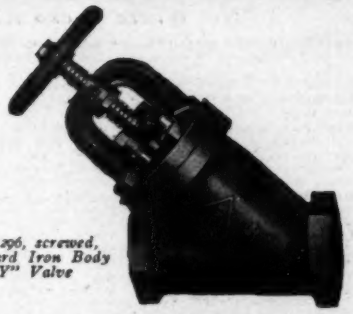

Fig. 296, screwed, Standard Iron Body "Y" Valve

In handling liquid pulp

you will find this valve highly satisfactory. It has opening nearly in line with the pipe—and gives free passage for heavy, thick fluids. Also widely used for boiler blow-off service. Standard and Extra Heavy Patterns. Jenkins "Y" valves made in bronze.

JENKINS BROS.

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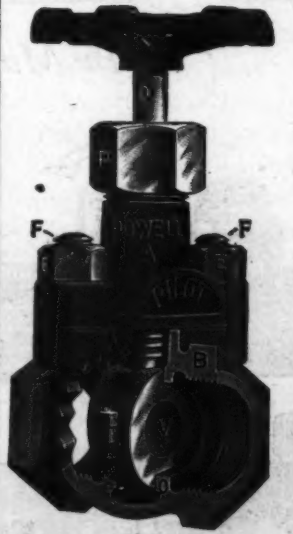
Always marked with the "Diamond"

Jenkins Valves

SINCE 1864

POWELL VALVES

"Pilot" Gate Valves



All iron or iron body with steam bronze trimmings. Simple in construction.

Economical and Reliable

Avoid disappointment in Valve Service by specifying POWELL VALVES

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COMPLETE PAPER MACHINE—80" trim. Made by Pusey & Jones. Fourdrinier, two presses, 26 dryers, one stack of calenders, reel, winder, marshall drive.

FOURDRINIER TISSUE MACHINE—One 68".

FOURDRINIER PARTS—Pusey & Jones 112", 100" equipped with new Century shake. 90" Kutter Trowbridge.

PRESS PARTS FOR PAPER MACHINES—Pusey & Jones bell crank housings and Black & Clawson swing arm housings. Press rolls 18"x110" and 20"x88".

DRYERS—Four 48"x111". One 36"x80". Two 56"x84". Nine 36"x82". Two 36"x74". Four 48"x72". Four 48"x62". One 84"x67". Eleven 42"x66". Eight 36"x62". Two 36"x48". Four 20"x20".

CHILLED CALENDERS—One 82" seven roll and one 84" nine roll made by Farrel. One 86" six roll. One 82" five roll. One 46" five roll. One 58" five roll. One 54" five roll.

SLITTERS AND WINDERS—One 84" four drum and one 72" two drum M. & W. winders with slitters. One 120" Warren. One 108" Kidder. One 46" Langston. One 40" Kidder. Two 48" core cutting machines.

BEATERS—Three 72"x42", two 54"x34" N. & W. One Holyoke 54"x90". One Dilts 62"x50" iron tub. One Jones 62"x52". One Dillon 60"x48". Two Emersons 54"x60". Three Downingtown 54"x42" iron tubs. One Jones 42"x38". Six Horne 36"x36". One N. & W. 36"x36". Two No. 2 Claflins.

JORDANS—Two Jones Imperial. Two No. 2 Dillon Improved. Two Monarchs. One large and two small Horne. One Jones Standard. One small Emerson. One Appleton Wazz Majestic. Four Stevens digesters. One Pope brushing.

SCREENS—Three 12 plate. Two 8 plate open side Packer. Two 6 plate. Three white auxiliary and one Moore & White auxiliary. One single cylinder Wandel.

STUFF PUMPS—Deane triplex 9"x8". Goulds triplex 8"x12". Goulds triplex 6"x12". Beloit duplex 6"x14". Two P. & J. duplex 8"x10". Two 6" P. & J. single plunger. Twelve 5" post stuff pumps.

REVOLVING SHEET CUTTERS—62" and 84" Moore & White. Four 60" and one 66" Hamblets. One 48" one 45" and four 80" Finlays. One 82" and 63" and 45" Clark. One 50" Hamblet diagonal.

REAM CUTTERS—Two 48" Acme. Two 44" Cranston under cut.

SUPER CALENDERS—One 52", one 45", one 42", one 36" Holyokes. One 45", one 40" P. & J. One 45" Granger.

WET MACHINES—Four 72" Bagley & Sewall hydraulic. One 58" N. & W.

ENGINES—American Ball variable speed 120 H. P. and one 7"x10", one 10"x10". One 12"x30" Putnam.

Two Daniels Rag Cutters — One Manistee Hog Chipper
One 50" Farrel Board Calender — One Ryther & Pringle Shredder
One screw and two hydraulic Holyoke presses

We have a large number of pumps and over five hundred calender, press and couch rolls in stock

FRANK H. DAVIS COMPANY

175 Richdale Ave., Cambridge 40, Mass.

Rigid Economy in Material Handling accomplished with

O. S. DEPENDABLE
Locomotive Cranes and Buckets

Rapid in operation — Low maintenance cost

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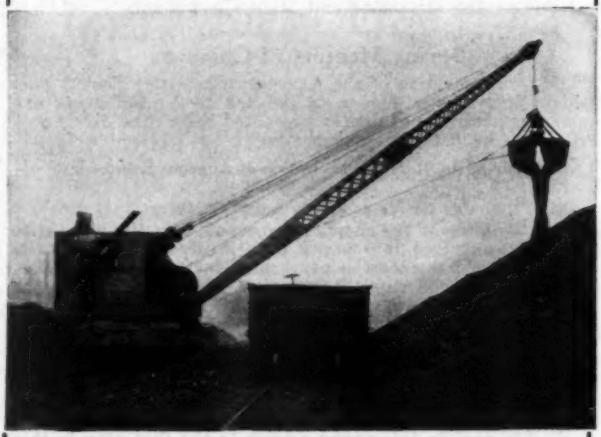

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Real Merit Placed

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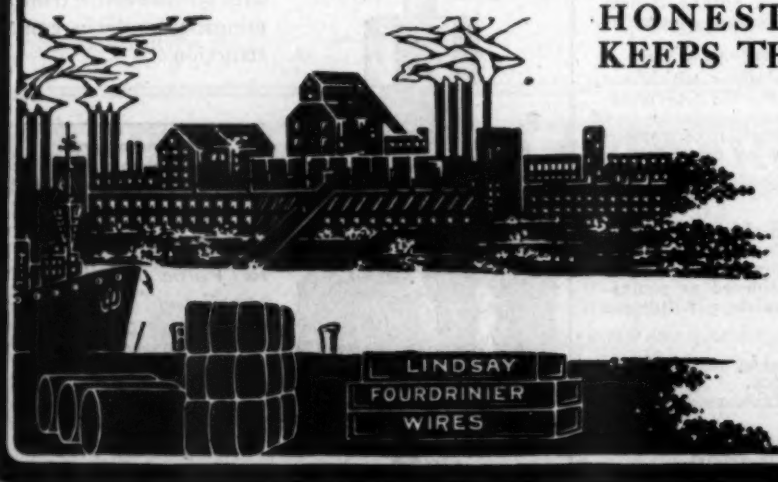
In Many Mills



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They are ready to serve you

The Lindsay Wire Weaving Company

Collinwood Sta., Cleveland, Ohio

"Ask any Papermaker"

chip. The results indicate very uneven distribution of combined SO_2 (K = 0.1) and fairly uniform distribution for free SO_2 (K = 1.0 to 2.0) in two hours.

2. Penetration Experiments by Total Submergence.

A. A method of standardizing wood plugs as regards moisture content. This involves storage of the wood in an atmosphere of constant moisture content.

B. A description of the method of treating wood plugs. This involves immersion in the desired solution for a given time and at the temperature and pressure desired.

C. Penetration experiments with 2% Na_2SO_3. Runs were made at 25 degrees C. and 100 degrees C. using pressures of 14.7, 65, and 115 lbs. absolute. Results show maximum pressure-effect between 14.7 and 65 lbs. The maximum penetration occurs during the first hour. The rate of penetration is nearly doubled with change of temperature from 25 degrees C. to 100 degrees C. It would require a long period of time for saturation, providing no cooking or chemical change occurred in the wood. The above results were obtained with wood blocks containing 35% moisture. Results with blocks of 2.5 and 1.5 inches in length would indicate the possibility of predicting concentrations with blocks of any length.

D. Penetration experiments with 2% NaCl. Runs were made at 65 and 115 lbs. pressure and at 25 degrees C. and 100 degrees C. Na_2SO_3 has a higher penetration rate than NaCl. Runs made with blocks of 25% and 8% moisture indicate increased penetration with decreased moisture content.

E. A discussion of these penetration results, especially with regard to varying moisture content.

1. The solution largely penetrates in the direction of the grain of the wood.

2. The higher the moisture content, the less space is available in the wood for the solute. Penetration under pressure with a water-soaked block would be by diffusion only because there would be no air space for the solution.

F. The influence of free SO_2 upon the rate of penetration of combined SO_2 was studied, using spruce wood blocks 2½ x 1½ x 1½ inches and containing 30-35% moisture. It was found that free SO_2 greatly increases the rate of penetration of combined SO_2. The increase in rate is proportional to the increase in concentration of free SO_2.

G. Suggestions for further work which will be studied by the authors:

1. The influence of free SO_2 upon the rate of penetration of combined SO_2.
2. The influence of the size and shape of the chip.
3. The influence of moisture content on the rate of penetration.
4. The effect of using combined SO_2 with calcium, magnesium, and sodium bases.
5. The influence of other electrolytes, as NaCl, on the penetration of sulphites.
6. Lateral penetration versus penetration with the wood grain.
7. The effect of preliminary steaming of the wood.
8. The effect of presoaking the wood in the solvent.
9. Typical Cooking Experiments.

In order to illustrate more clearly the effects which may be produced by altering the size of wood chip used in chemical digestion, we have included in this survey a few typical experiments carried out in laboratory digesters. The acids used were made with a calcium base of 1% combined and 5% free strength. The results tabulated indicate in an exaggerated way the influence chip size has on quality of pulp and yields.

Chemistry of Pulps: A Comparison of the Chemical Changes of Jack Pine and Aspen Woods Cooked by the Soda Process

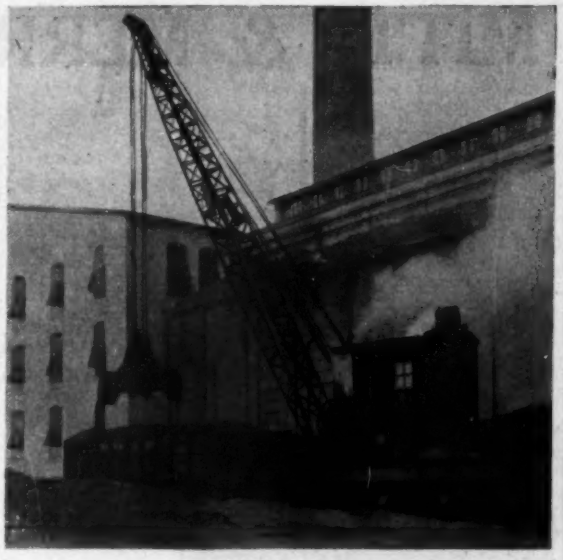
By M. W. Bray and T. M. Andrews

The chemical changes which take place in jack pine and aspen woods during the decomposition to pulp with caustic soda solution under one set of conditions, have been studied.

The yield of pulp decreases very rapidly during the initial part of the cook to practically a constant value. During this period of rapid drop in yield, most of the chemical changes take place in the wood and products of the cook. This is shown by the rapid increase in purity of the pulps in cellulose with subsequent loss of lignin.

The rate of decomposition of the cellulose is proportionately more rapid than the rate of decomposition of the lignin during the early stages of cooking, the ratio of lignin to cellulose removal being approximately 1:1. As the cook proceeds the ratio increases to a higher value which is maintained to practically the end of the cook. This indicates that with the present methods of cooking, even under refined methods of control, it will be impossible to obtain the yield of cellulose predicted by chemical analysis of the wood.

The pentosan content of aspen is reduced rapidly during



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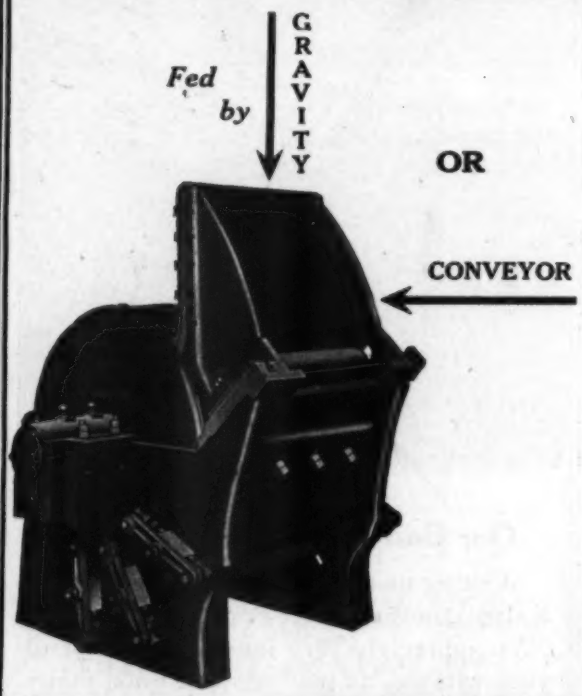

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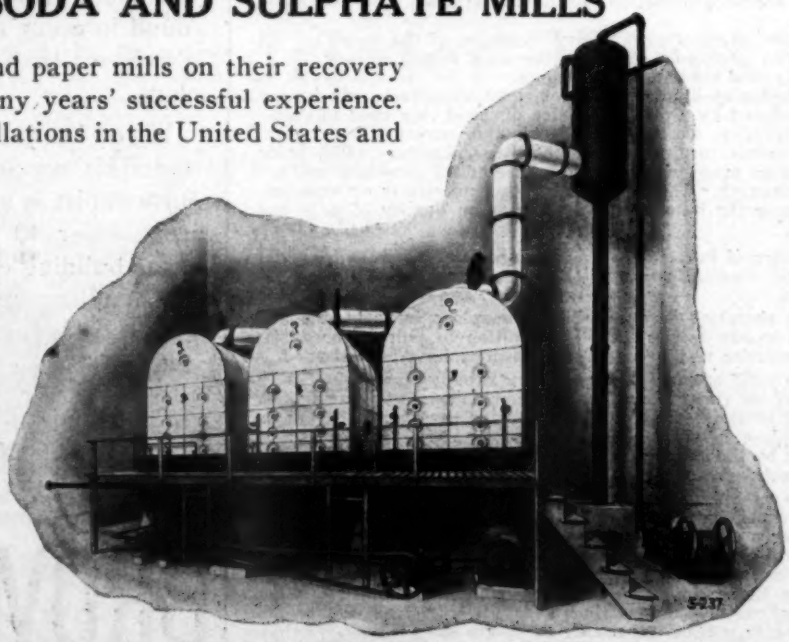

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the early stages of the cooking process, to a constant value (7.7 per cent). This minimum value is reached at the same time that the maximum purity of the pulp is attained. This indicates that pentosans are present in at least two forms, one readily removed from the cellulose nucleus by hydrolysis and the other held in more stable combination with the cellulose.

The alpha-, beta-, and gamma-cellulose was in each case determined in the cellulose. The alpha- and beta-cellulose for both woods decrease only slightly throughout the cook, while gamma-cellulose decreases rapidly to a low constant value early in the process.

The Action of Concentrated Hydrochloric Acid on Different Celluloses

By E. C. Sherrard and A. W. Froehlke

This paper contains curves illustrating the change that occurs in the optical activity of four celluloses upon treatment with concentrated hydrochloric acid. Curves are also given showing quantities of reducing sugar produced under the same conditions. Since some of the celluloses, which chemical analysis showed to be quite different, gave similar changes in optical activity the conclusion is drawn that the method is of little value as a means of differentiating celluloses.

Effect of Acids and Salts Upon the Hydrolysis of Wood

By E. C. Sherrard and W. H. Gauger

The paper describes further experimental work that has been done in an effort to find a catalyst that would assist in the hydrolysis of wood. The effects produced by several salts and a number of inorganic and organic acids are described. The action of sulphuric acid in concentrations ranging from 5 per cent to 30 per cent under various conditions is also given. Mannose was found to decompose at the same rate as glucose when subjected to the same conditions of temperature, time of digesting and concentration of sulphuric acid.

Methoxyl in Wood Charcoal

By L. F. Hawley

It was shown in a previous publication that charcoal still contains a large proportion of the methoxyl groups of the wood from which it was made. On heating the charcoal to higher temperatures these methoxyl groups are apparently given off as methane. Attempts were made to treat the charcoal chemically so as to obtain these methoxyl groups in the form of methyl alcohol. In making blank determinations it was found that a small amount of alcohol was given off by heating charcoal to 730 degrees Centigrade, and that slightly more was obtained by temperatures above this point. The total methyl alcohol found was about three-tenths of 1 per cent of the weight of the charcoal. By distilling the charcoal in the presence of lime this could be increased to about five-tenths per cent. By distilling in a small stream of air or of carbon dioxide about the same yield was obtained. Numerous other treatments were tried but the yields could not be increased to a point where they were of any commercial interest.

Investigation of the Hypobromite Method for Determining Bleach Requirements of Pulps

By T. M. Andrews and M. W. Bray

Tingle's hypobromite method for determining the bleach requirements of pulps has been tried under varying conditions on sulphite and soda pulps. It was found necessary, in order to avoid errors due to volatilization of the bromine, to dilute the reacting solution and to maintain the temperature between 23 degrees and 28 degrees Centigrade. For sulphite pulps the method is of definite value provided the necessary precautions, as pointed out, are properly observed and provided the variations in bleach requirements are not too great. For soda pulps the method can not be recommended without further investigation owing to an apparent lack of constancy in the ratio of the chlorine factor to the bleach required.

Analytical Methods Incidental to the Determination of Sizing Efficiency

By H. M. Eastman

An attempt has been made to outline the analytical methods, both physical and chemical, which cover in a general way this important factor of paper manufacture. These methods are adaptable for mill control as well as for sales or purchasing organizations. The methods have been designed to give maximum value for minimum cost. This article is intended to be the first of a series on this vital paper-making problem.

The Action of Chloral on Cellulose

By J. H. Ross and J. M. Payne

An attempt was made to condense chloral with cellulose in order that the condensation products might be studied as to their relation to the primitive molecule of cellulose.

Cotton wool was used. The reaction was carried out ac-

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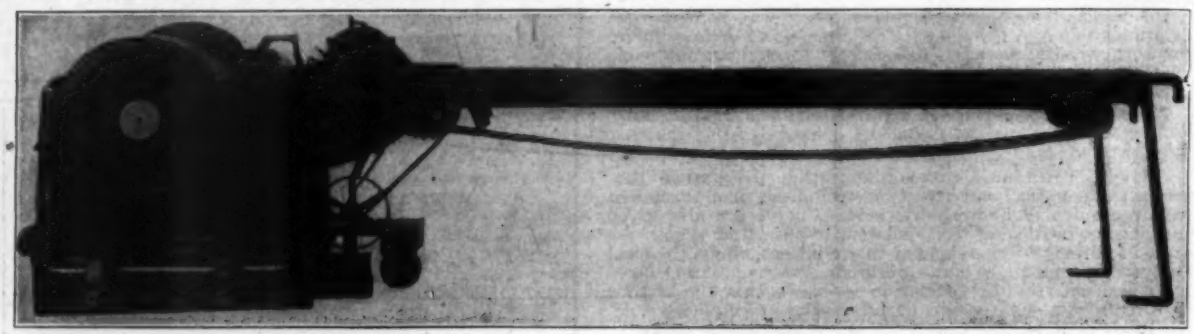

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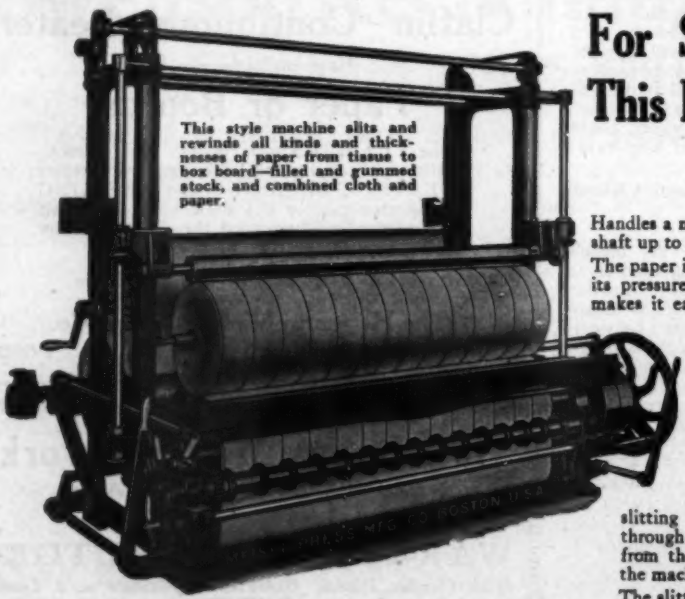

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cording to the method of Meunier (Bull. de la Soc. Chim. (3) 11 (125) 1894) by treating the cellulose with chloral hydrate in the presence of concentrated sulphuric acid.

No chloral polysaccharides were isolated by this method: but four compounds corresponding to dichloral glucoses and two monochloral glucoses were found.

Potato starch and glucose under the same conditions give the same compounds though the yields are not identical.

Chloral reacting on cotton wool in a sealed tube at 105 degrees gave a black char which was easily powdered.

A catalyst was not found to replace the H_2SO_4. $CuSO_4$, $ZnCl_2$ and Ac_2O were tried without success.

The Presence of Mannose in White Spruce Cellulose

By E. C. Sherrard and S. S. Aiyar

The paper describes some experimental work that was done in an effort to determine the distribution of mannose in the products resulting from the acetolysis of spruce cellulose. It was found that the octacetate contained no mannose, the water soluble dextrin acetates contained 22.6 per cent of total mannose, while the water insoluble dextrin acetates contained 24.8 per cent. The remainder was apparently lost in recovering the products of acetolysis. The conclusion reached is that cellobiose constitutes a nucleus of the cellulose molecule.

Chemistry of Wood, VI—Analyses of Heartwood and Sapwood of Some American Species

By G. J. Ritter and L. C. Fleck

Analyses of five hardwoods and five softwoods are given. Softwoods show a higher yield of water, alkali, and ether extractives but a lower yield of cellulose and lignin in heartwood than in sapwood. Hardwoods are divided into two classes, (1) those with high extractives in the sapwood, and (2) those with high extractives in the heartwood. High yields of extractives in heartwood or sapwood are accompanied by low yields of cellulose or lignin, generally both; low yields of extractives, by high cellulose and lignin.

Data show that the ratio between methoxyl and lignin is considerably higher in hardwoods than in softwoods.

Speculations on the Formation of Products Related to Lignin

By Harold Hibbert

The electrolytic reduction of crotonaldehyde has been shown (Hibbert & Read) to yield dimethylpentene aldehyde. Substitution of the former by methyl cretonate might be expected to yield a corresponding methoxy methylester. Such a product should possess many of the characteristics of lignin. For example, it would contain an unsaturated ethylene linking; a methoxy group, and a methyl ester capable of yielding methyl alcohol on warming with alkalies. It would presumably also possess a marked tendency to undergo polymerisation. A second mode of synthesising such derivatives would probably be found in the catalytic dehydration of methyl adipate by means of a trace of iodine.

The Relation Between Chemical Composition and Durability of Wood

By L. F. Hawley and L. C. Fleck

A recent publication (Forest Products Laboratory Technical Note No. 173) gives a rough numerical relationship between the durability of various species of wood. In studying these most durable species it was evident that in all cases where the chemical composition was known the durable wood contained a large amount of some kind of extractive, either a tannin, a coloring matter, a resin or volatile oil. Durable species whose composition was not known have been examined and high extractives have been found. Toxicity tests have been made on some of the water extracts of different species.

Chemistry of Wood, VII.—On the Relation Between the Methoxyl and the Lignin in Wood

By G. J. Ritter

Data show (1) that a larger percentage of the total methoxyl of the original wood is recovered in the isolated lignin of softwoods than of hardwoods; (2) that sawdust repeatedly treated with dilute alkali under pressure gives up 63 per cent of its methoxyl content as methanol; and (3) that the proportions of total lignin and methoxyl of the original wood remaining in the residues of sawdust chlorinated for varying periods of time are compared. These proportions agree closely in basswood and in incense cedar, but not in tan oak, indicating that the methoxyl groups are all associated with the lignin and in the same manner in either of the first two woods, but not in the last.

Cyclic Acetals from Tetramethylene Glycol

By Harold Sanford Hill and Harold Hibbert

Cyclic acetals containing seven-membered rings have been made from aldehydes (as well as from acetylene) and tetramethylene glycol. Partition experiments between the latter and ethylene glycol show that the five-membered ring is formed much more readily than the seven.

The work is to be continued so as to include eventually 10, 11 and 12-membered rings since the study of such derivatives should throw considerable light on the arrangement of the atoms (spiral formation or otherwise) and the stability of such ring structures.

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New York, May 1, 1923.

ACTIVITY in the paper industry continues on a broad scale. Manufacturing is proceeding at a rate which is establishing a new high record of production, and from all corners of the trade come reports of a steady demand of large volume, of firmness in prices, of gradual increase in mill operations and of generally favorable market conditions. Perhaps the most gratifying feature of the prevailing situation in the industry is that it is founded on a basic healthy condition. Business in various lines is good and expanding. One only has to observe the wage advances that have been put into effect in the textile, steel, clothing and other of the country's major industries to realize that industry is in a sound and active position, that manufacturing plants are busily engaged and that they are finding a market for their output. This, of course, accounts for the lively condition of the paper industry. Paper of all kinds is being consumed extensively because the active positions of other industries demand it, and what is more and in spite of the numerous calamity howlers who are constantly popping up trying to "take the joy out of life" and business, there are numerous indications that activity in the paper trade will continue on at least its present scale for a considerable time to come.

Using statistics as a basis, it is readily to be seen that the paper mills of the country are hanging up new records with regard to production and shipments. The Federal Trade Commission's report for February shows that while the total production of paper in that month was less than in January—owing to the shorter month—figured according to the number of working days in the month a greater output was reached than in the first month of the year, and in January, it will be remembered, a larger total tonnage of paper was produced than probably in any single month in the history of the industry.

February output of paper of all kinds by American Mills amounted to 614,364 tons, compared with 664,537 tons in January. On the basis of 22 working days in February and 26 working days in January, the average daily production in the former month was about 27,925 tons, or 2,366 tons greater than the average daily output of approximately 25,559 tons in January.

The Commission's report on the news print industry for March, just issued, is even more enlightening concerning the brisk operations of mills. Production of print paper by domestic manufacturers in March totaled 129,294 net tons of total newsprint, which doubtless established a new high record in a single month, comparing with 114,611 tons produced in February of this year and 127,452 tons in January. Despite this big output, manufacturers shipped out more paper in March than they produced, shipments amounting to 132,292 net tons and thereby reducing mill stocks from 23,197 tons held at the beginning of March to 20,199 tons at the end of that month. March production of newsprint was no less than nine per cent in excess of that for the same month a year ago, and was seven per cent above the average monthly output for the past five years.

Newsprint production in the United States and Canada combined was over 235,000 net tons, establishing a new high record. Shipments from mills in the two countries exceeded this by at least 1,000 tons, so that all of the paper manufactured in that month was promptly moved out to publishers. Consumption of print paper in the United States in March is said on good authority to have been the heaviest on record with the lone exception of October, 1922. Normally less newsprint is consumed in the spring than in the fall, and the high consumption thus far this year is taken to indicate that the record of about 2,500,000 tons in 1922 will be substantially exceeded in 1923.

No less an authority than President Philip T. Dodge of the International Paper Company looks for an advance in news print prices. Mr. Dodge is quoted as saying several days ago that he does not see how newsprint prices can help but be higher in view of the generally increased wages, higher raw material prices and higher transportation costs. Mr. Dodge expects that the prevailing price of $75 a ton on contract will be advanced to at least $80 for the third quarter of the year. He added that the mills of his company are operating at capacity, and that after two years of unprofitable operations the company had reached a point where it was earning its fixed charges, its preferred dividends, and had reported a balance for the common stock in addition.

Increased wages for print paper mill workers are likely to have much to do with fixing prices of newsprint over the balance of the year. At a meeting held in New York last week between representatives of nine of the largest news print manufacturing companies in the United States and Canada and six labor unions controlling men employed by these mills an agreement was signed for one year, effective May 1, increasing wages for all crafts in the newsprint industry five cents an hour and fixing the minimum wage for common labor at 40 cents an hour. The mill workers had asked for an increase of eight cents an hour for unskilled and ten cents an hour for skilled labor. The agreement affects about 30,000 paper and pulp mill employes.

The fine paper branch of the industry is showing sustained activity, with demand for many grades of bonds and ledgers steadily expanding. Prices are firm and in frequent instances manufacturers are revising quotations upward. Book papers are moving in larger volume constantly. Publishers are absorbing all the supply they have contracted for and are repeatedly coming into the market to augment their supplies. Most book mills are running at capacity and many of them are a good way behind in deliveries. Prices are fully maintained with the tendency upward.

There has been some little easing of demand for wrapping and tissue papers since the pre-Easter shopping season, but manufacturers with few exceptions have enough orders on hand to keep them well engaged, and quotations are firm. Wrapping paper is still being imported in sizable amounts, but there is nevertheless a steady call for the domestic product.

Box boards have been in a rather irregular market position. Buying has been chiefly in spurts, and prices have fluctuated on a fairly broad range. Current quotations are about $60 a ton on filled news board and on plain chip board f. o. b. New York. On some occasions mills have accepted orders at below this price but as quickly as they have booked a fair amount of business they have withdrawn the lower quotations. Folding box boards and boards for the corrugated box industry are in good demand.

United States Civil Service Examination

The United States Civil Service Commission announces the following open competitive examination:

Technologist, $2,800 to $4,000 a year.
Associate technologist, $2,000 to $2,800 a year.
Assistant technologist, $1,500 to $2,000 a year.

Applications will be rated as received until further notice. The examination is to fill vacancies in the Bureau of Standards, Department of Commerce, for duty in Washington, D. C., or elsewhere, and vacancies in positions requiring similar qualifications. Appointees at a salary of $2,500 a year or less, may also be allowed the increase of $20 a month granted by Congress.

Applicants must have graduated from a full four-years' high-school course or have completed fourteen high-school units accepted for college entrance; and, in addition, they must have graduated with a degree from a college of recognized standing with the completion of at least 118 credit hours, such course to have included the fundamentals of chemistry, mathematics, and engineering or physics. Applicants who have completed at least two years of the college course may substitute twelve months of qualifying industrial experience for each of the other years lacking completion of the course.

Applicants may choose from the following optional subjects: Rubber technology, leather technology, paper technology, textile technology, oil technology, enameled metal technology, some special branch of technology not included in any of the above.

Competitors will not be required to report for examination but will be rated on the following subjects: General education and experience; special education and experience in the optional selected, and fitness; and writings to be filed with the application.

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Caustic Soda

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Domestic Raw Materials

Papermaking Rags

There has been a little softening of prices of papermaking rags. This is to be expected in the spring, when incoming supplies from collection sources increase and when consumers confine their buying principally to lots needed for direct use, and the fact that prices have not receded as much this spring as they ordinarily do at this time of the year is regarded as an indication of fundamental strength in the rag market. Moreover, the declines that have occurred have affected the low or bulky grades almost solely, which seems further evidence that the easiness of the market is nothing else than a seasonal condition.

There are several bullish factors in the rag situation. One of these, and possibly the most important, is that consumption is at a high level. The pace which writing, blotting, book and roofing paper mills have set during the past few months means that abnormally large amounts of rags have been used. From all indications, consumption is continuing in heavy volume, and gives promise of keeping up at the present rate or near to the present rate for the balance of this year at least. Another factor is that the situation abroad in papermaking rags is growing stronger daily. For quite a space of time European dealers had big accumulations of rag stock to work off in sales to American consumers, but buying on the other side of the Atlantic by paper manufacturers in the United States in recent months has been of such magnitude that, according to reliable information, rag stocks in Europe are being rapidly diminished. The result is that offerings from foreign sources to mills in this country are decreasing both as to number and volume, and it appears unlikely that consumers in the United States can hope to depend on imported supplies to as great an extent as they have in recent months. Furthermore, prices in the various European countries are stiffening to the point where foreign rags are as costly or costlier than domestic stock, which automatically reduces importations.

Another strong factor in the rag industry is that labor costs are steadily mounting. It is generally recognized that the cheapest form of labor is required for collecting, sorting and packing rags, but the fact that various other industries are increasing wages of common labor means that rag dealers have to meet this competition or else see their workers leave them for more remunerative employment. There is keen competition for common labor since the restrictive immigration laws have created a shortage of such workers, and there is no question but that a great many laborers in the rag trade are deserting that industry for other forms of employment, which results in smaller collections of rags all over the country.

It is these things which prompt dealers to adopt a very firm attitude with regard to rag prices at this time, and which doubtless account for market levels having failed to drop to relatively as low levels as are usually found to prevail in the spring of the year. Rag merchants and importers are noticeably cautious about making mill commitments involving large quantities of goods. Most of them are selling in a limited way as the stock becomes available, which condition in itself aids in sustaining prices since consumers are kept in the market as buyers nearly all the time.

There is, of course, the other side to the situation. Rag shortage is as old and as common as the proverbial cry of "wolf." It is as much a part of the rag dealer's business to try to make the paper manufacturer believe there is a shortage of rags as it is for him to gather his supply and prepare it for shipment to mills. Probably many of the reports being sent to consumers are greatly exaggerated; on the other hand, rag buyers cannot afford to overlook the facts as they exist, and it must be admitted that rag consumption has been heavy for some months past, that record-breaking imports have arrived from Europe, which should have materially reduced stocks across the water, and that the labor condition is not of the best. If consumption of rags by paper mills continues for a few months more at the same rate as during the first four months of this year, a honest-to-goodness rag shortage might very well develop, and the mere possibility of this is sufficient to make dealers practice caution about committing themselves and to take a firm view regarding prices.

There has been a lull in demand for most grades of new cuttings during the past several weeks. This seems due more to a change in the executive staff of the largest fine paper manufacturing organization of the country and a consequent letting down of raw material purchases by this company than to any other single cause, and dealers have maintained quotations fairly firmly, although here and there prices have receded slightly. No. 1 white shirt cuttings are quoted at around 13.50 cents a pound, f. o. b. shipping points, unbleached muslins at 12 cents, washables at 5.25 cents, blue overall cuttings at 8 cents, and white lawns at 11.25 cents.

Old white rags are holding their own in price and a good packing of No. 1 whites is bringing 8 cents a pound freely in sales to writing paper mlils. Old thirds and blues also are quotably steady at from 2.60 cents per pound upwards for repacked and around 2.25 cents for rough packing.

Roofing rags have eased a little in value. Prevailing prices in the East center on 1.65 cents a pound at dealers' points for No. 1 packing and 1.55 cents for No. 2 stock, and in the Middle West slightly higher prices than these are reported. Foreign dark cottons are bringing 1.60 cents a pound ex dock New York and are being readily absorbed; in fact, offerings of roofing rags of any kind do not remain long on the market, as mills are buying in a consistent manner.

Average quotations, f. o. b. shipping points and ex dock, are:

New Stock—	New York and Chicago
White shirt cuttings, No. 1	13.50-14.00
White shirt cuttings, No. 2	7.00- 7.25
Fancy shirt cuttings	6.75- 7.00
Washables, No. 1	5.00- 5.25
Unbleached muslins	12.00-12.25
White lawns	11.25-11.50
Overall cuttings, blue	8.00- 8.25
Black silesias	5.25- 5.50
Light flannelettes	10.00-10.25
Canton flannels, bleached	11.00-11.25
Canton flannels, unbleached	9.75-10.00
Shoe cuttings, bleached	10.25-10.50
Shoe cuttings, unbleached	8.50- 8.75
Light silesias	8.25- 8.50
O. D. khaki cuttings	5.25- 5.50
Mixed khaki cuttings	4.25- 4.50
Corduroy cuttings	4.00- 4.25
Cottonade cuttings	3.75- 4.00
Linens, No. 1 white, foreign	15.00-16.00
Light prints, foreign	5.25- 5.50
Old Stock—	
Whites, No. 1, repacked	7.50- 9.00
Whites, No. 2, repacked	4.25- 4.75
Whites, house soiled	2.50- 2.75
Whites, street soiled	2.25- 2.50
Lace curtains	3.75- 4.00
Thirds and blues, rough	2.20- 2.35
Thirds and blues, repacked	2.60- 2.75
Black stockings	3.25- 3.50
Cotton canvas, No. 1	4.25- 4.50
White cotton batting	6.00- 6.25
Roofing, No. 1	1.60- 1.75
Roofing, No. 2	1.50- 1.65
Dark colored cottons, foreign	1.55- 1.65
Blue linens, foreign	3.50- 4.00
Grey linens, foreign	5.50- 6.00
White linens, foreign	10.00-10.50
Light prints, foreign	2.50- 2.75

Rope and Bagging

Old rope, which is used chiefly in the manufacture of bag and other strong papers, is still one of the firmest items in the papermaking supplies trade. Mills are absorbing old rope freely, and apparently are not haggling about price, their one idea being to cover requirements. Prices are indeed firm, and the fact that they are so well stabilized at levels where sellers have no cause to complain seems to be preventing any further rise. Dealers report that domestic manila rope in No. 1 dry condition is bringing 7 cents a pound at shipping points, and that only in occasional instances are sales made below this price basis, though in cases rope has been secured by consumers at a quarter of a cent per pound less. Foreign

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Importers---Dealers

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manila rope is quoted by importers at close to the same prices prevailing on domestic stock, but in a majority of cases buyers are succeeding in getting imported material at a quarter to a half cent per pound under the domestic article, this being due largely to the matter of quality. Supplies of old rope appear light. World shipping is nowhere near normal; a great number of vessels are inoperative, and the result is that old rope production is not normal because the shipping industry produces the great bulk of old rope. However, incoming supplies seem ample to cover the wants of consumers, though the limited production, coupled with the large consumption, holds prices firm on a comparatively high level.

There is not much activity in old bagging. Consumers are buying in routine fashion and volume, and they are securing the supplies wanted at about their own prices since stocks are more than sufficient to cover the demand. Gunny bagging is the firmest grade, while there have been periodical spurts of demand for scrap burlap from roofing paper mills. Prices show little change.

F. o. b. shipping point quotations follow:

	New York and Chicago
Gunny, No. 1 domestic	1.60-1.75
Gunny, No. 1 foreign	1.50-1.60
Scrap bagging, No. 1	1.25-1.35
Roofing bagging	1.00-1.10
Wool tares, heavy	1.50-1.65
Wool tares, light	1.40-1.50
Manila rope, No. 1 foreign	6.50-6.75
Manila rope, No. 1 domestic	6.75-7.00
Sisal strings	1.25-1.50
Mixed strings	.90-1.00

Old Paper

Weakness has been the outstanding characteristic of the old paper market. Demand from mills has not measured up to the supply in dealers' and packers' hands, and, as is invariably the case when this commodity fails to move freely, prices have tumbled with great rapidity. Within the past several days, however, a steadier undertone has developed. Indications are that prices were permitted to get down so low that collections were affected, which in turn has caused the market to assume a different complexion with prices displaying a tendency to react upward. In New York it is reported that collectors of waste paper have gone on strike, claiming that they could not realize a profit in their operations under prevailing market prices. Collections in other large centers have been greatly reduced, according to reports, and the position of the market at this writing is such that it is difficult to say which way the trend of values really is.

Low grades have been chiefly concerned in the downward slide of prices, and common mixed paper has eased off to 65 cents a hundred pounds at shipping points, and No. 1 mixed paper to as low as 85 cents. Packers contend there is no room for profit under these mill prices, particularly since producers of old paper have become so educated regarding the value of the commodity and demand such stiff prices when contracting with paper stock packers. Folded newspapers are down to 1.10 cents a pound, f. o. b. shipping points, old kraft paper to 2.15 cents, and heavy No. 1 book stock to 2.10 cents. Shavings are quoted at an average of 4.25 cents per pound for No. 1 hard white, and 3.50 cents for No. 1 soft white.

F. o. b. shipping point quotations are:

	New York and Chicago
Hard white shavings, No. 1	4.15-4.40
Hard white shavings, Nos. 2-3	3.25-3.75
Soft white shavings	3.40-3.60
Colored shavings	1.75-2.00
Heavy book, No. 1	2.10-2.25
Crumpled book, No. 1	1.80-1.90
Ledger stock	2.60-2.75
Kraft, No. 1	2.15-2.25
Manilas, No. 1	1.40-1.50
White blank news	2.10-2.25
Over-issue news, No. 1	1.35-1.45
Folded news	1.10-1.20
Mill wrappers	1.15-1.25
Boxboard cuttings	1.00-1.10
Mixed paper, No. 1	.85- .95
Common paper	.65- .75

Chemical Pulp

While it is commonly acknowledged that demand for chemical wood pulp is nothing out of the ordinary, insofar as the volume of buying is concerned, the strong position of imported pulps and expectations on the part of domestic producers of much better business later in the year, together with a moderate demand of at least consistent character if not of broad dimensions, have been creative of a firm price tone. Most kinds of domestic wood pulp are selling at higher prices than

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have prevailed in a couple of years. Foreign competition is not as keen as it was before the Swedish pulp mill strike, and manufacturers in the United States are looking for consumers to fill a larger portion of their requirements over the remainder of 1923 with domestic pulps than they have in the past several years; therefore, prices are well sustained and in frequent cases producers are marking up quotations.

Domestic pulp mills can still accommodate considerable more business. Few of them are working at capacity or even at close to full production, but they nevertheless are enjoying more favorable market conditions than in a lengthy period, and indications are that if consumption by paper manufacturers keeps up at the rate of the past few months domestic pulps are going to be in by far greater demand than since the war.

Bleached sulphite is quoted at 4.75 to 5 cents a pound at pulp mills, with the selected grade quoted at 5.25 cents. Bleached is in good demand, though most of the business is on contracts, spot buying being of rather limited proportions. Unbleached prime sulphite is quoted at 3.25 to 3.50 cents a pound at producing plants, easy bleaching at 3.50 to 3.75 cents, and news grade sulphite at around 3.20 cents. Kraft pulp is firm at from 3.25 cents upwards, while bleached soda pulp is generally quoted at 3.25 cents.

F. o. b. pulp mill quotations follow:

Bleached sulphite	4.75-5.25
Easy bleaching sulphite	3.50-3.75
Unbleached sulphite, No. 1	3.25-3.50
News grade sulphite	3.10-3.30
Soda pulp, bleached	4.00-4.25
Mitscherlich, unbleached	3.50-3.75
Kraft, No. 1	3.25-3.50
Screenings, refined	1.50-1.75

Mechanical Pulp

Ground wood quotations are on a rather broad range—so broad, in fact, that it is somewhat difficult to say exactly what this commodity is worth. Prices depend today largely on the location of the producing or the consuming plant. Water conditions have improved substantially in some grinding districts, with the result production has increased and prices have declined; in other localities grinders are still hampered by unfavorable water conditions, and, with available supplies light, prices are maintained.

Domestic manufacturers in a majority of cases are quoting around $40 a ton, f. o. b. pulp mills, for prime spruce ground wood for prompt shipment, with quotations ranging several dollars a ton on either side of this level in different quarters. Canadian producers are said to have sold ground wood at as low as $30 a ton, though it is stated that about $35 is a more representative market quotation in the Dominion. Demand is fair, but consumers are generally buying in a hand-to-mouth way, presumably figuring as summer approaches grinding will increase and more pulp will become available.

Chemicals

Prices of casein have again firmed, and the quotations commonly named are between 21 and 22 cents a pound for spot shipments, with now and then a transaction reported down to 20 cents. Bleaching powder is holding steady at about 2 cents a pound and is wanted in fairly large quantities. Caustic soda is quoted at 2.50 cents a pound at works, and soda ash at 1.25 cents on an average. Brimstone is unchanged at $18 to $20 per long ton, f. o. b. mines, while no alteration in prices of china clay has been recorded. There is a moderately good call for most of the chemicals used by paper and pulp manufacturers, with both spot and contract buyers figuring in the trade activity.

Average quotations are as follows:

Alum, lump ammonia	3.25- 3.50
Alum, lump starch	3.75- 4.00
Blanc fixe, powdered	4.00- 4.25
Bleaching powder	1.90- 2.00
Brimstone (long ton, at mine)	18.00-20.00
Casein (duty paid)	20.00-22.00
Caustic soda, spot delivery	2.50- 2.75
China clay, domestic washed	12.00-15.00
China clay, foreign	16.00-22.00
Rosin, grade E	6.15- ...
Satin white	1.50- 1.75
Soda ash, 58 per cent light (bags)	1.20- 1.30
Starch, papermakers', in bags	2.81- ...
Talc (ton)	14.00-16.00

The Parsons Trading Company, paper exporters and importers of New York City, has moved to 110 East Forty-second Street, after having been located at 17 Battery Place for a good many years.

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White rag	20-45
White sulphite	12-30
Colored rag	16-40
Ledger—	
White rag	20-50
White sulphite	14-30
Colored sulphite	15-30
Colored rag	16-50
Bonds—	
White rag	19-45
White sulphite	10-30
Colored sulphite	11-30
Colored rag	18-45
Book—	
No. 1 S. & S. C.	7.00- 7.75
Machine finished	6.75- 7.50
English finished	7.00- 7.75
Coated and enameled	9.00-14.00
Lithograph, M. F	9.50-14.00
Newsprint—	
Rolls, contract	3.75- 4.00
Rolls, transient	4.00- 4.25
Sheets	4.25- 4.50
Side runs	3.25- 3.50
Cover Stock—	
Coated, both sides	10.25
Coated, one side	10.15
Tissue—	
No. 1 white, 20x30	.90- 1.00
No. 2 white, 24-36	.80- .90
No. 1 manila, 24-36	.80- .90
Kraft	1.00- 1.25
Wrappings—	
No. 1 Kraft	7.00- 7.50
No. 2 Kraft	6.25- 6.75
Boards—	New York and Chicago
Solid news	65.00-70.00
Straw	60.00-65.00
Plain chip	60.00-65.00
White coated chip	80.00-85.00
Manila coated chip	75.00-80.00
Binders' board	85.00-90.00

Recent Publications

The Mathieson Alkali Works, Inc., of New York, has just issued a very attractive 32-page book on "Mathieson Chemicals for the Pulp and Paper Industry." This book is a very interesting and attractive presentation of all that its title implies; and from reports, is being well received by the industry.

Volume one of a small publication entitled "Business Chemistry" has just made its appearance. Quoting from its title page it is "Published every little while by Skinner, Sherman & Esselen, Inc., Boston, Mass., to turn the light of modern chemistry on problems of business and profits hidden in the waste piles of industry and latent in its processes and by-products."

One who says that atmosphere has no place in a booklet dealing with a technical subject such as, we'll say, turbines, would find a pleasant surprise in Bulletin 103 just issued by the Kerr Turbine Company of Wellsville, N. Y. A perusal of this bulletin not only impresses one with the earnest effort exerted to make Kerr Turbines what they should be, but it also offers a glimpse, through ivy-covered walls, of the harmony existing in the Kerr organization.

Instructions for the care and operation of Enco-Oil-Burning Installations are now available in convenient booklet form. This is published by The Engineer Company, New York, which company is manufacturer of Enco-Oil-Burning Installations. This work seems to be complete in every detail and carefully indexed.

The Stephens-Adamson Manufacturing Company of Aurora, Ill., has recently circulated an attractive booklet descriptive of their S-A Monitor car puller, which has just been placed on the market. The new device is a capstan type, self-contained, fully enclosed, compact, powerful machine. It is driven by a 7½ H. P. electric driving motor, and sufficient power is generated in the capstan to permit of pulling from three to five loaded cars on a level track.

The Link-Belt Company of Chicago and Philadelphia has recently issued a very comprehensive and instructive book on "Electric Hoists and Overhead Cranes." It is not only profusely illustrated with photographs of actual installations showing some of the most recent Link-Belt Electric Hoist applications, but with line and wash drawings the subject of proper installation and efficient operation is fully covered.

"Practical Facts About Belting" is the title of a publication bound in convenient loose-leaf form now being distributed by the Chas. A. Schieren Company of New York.

The Manitowoc Engineering Works of Manitowoc, Wis., have recently put out a very handsome and profusely illustrated booklet with items of their equipment.

Uniflow Improved Return Tubular Boilers are discussed in a thoroughly technical manner in a booklet now ready for distribution by the Lebanon Boiler Works, Lebanon, Pa. The description therein is graphically illuminated by ink sketches and reproduced photographs.

Du Pont Opens Service Department

A service of special interest to manufacturers from the viewpoint of economy and the prevention of deterioration, has been put into effect by the Paint Department of the du Pont Company. This service consists of a paint survey made by experts and its purpose is to inform plant managers if their present practice in painting is correct, and how their needs, if they have any, can be met through the new developments of special surface coverings, which are constantly being brought out by the research men in the paint and color business.

A large paper manufacturing concern in the East recently had such a survey made and the results showed that in general, their plant was in very good shape with walls and ceiling in practically all departments effectively painted to secure the maximum of efficiency and economy. Their system of painting certain parts with distinctive colorings was shown to be excellent. In certain other places it was pointed out that owing to excessive moisture conditions, certain kinds of paint products could be used, which would tend to stand up effectively against the conditions existing. Other recommendations for coatings that would lengthen the life of certain parts were made to cover specific needs of this plant. The recommendations were made generally, and as a result of the survey, the factory people were able to acquire a far broader idea of what actual benefit could be derived from the practice of putting the right paint in the right place.

New Mill Starts Production

The Charleston Paper Manufacturing Company, with mill at Nitro, West Virginia, started making paper about a month ago. This company was organized last August, and immediately began the erection of a new mill for the manufacture of both paper and board.

One 92" Fourdrinier machine is now in operation, and an 80" Cylinder machine, now being installed, will go into production about July 1st.

The mill is ideally situated on the Kanawha River, having facilities for shipping over three railroads, viz: The Baltimore & Ohio, The Chespeake & Ohio, The New York Central. The company draws its coal from mines located three miles below the mill.

The main building is of solid, reinforced concrete, 578 feet long. The Fourdrinier machine is able to produce about twenty-five tons of paper a day, and the Cylinder machine, when completed, will turn out between forty and fifty tons of box board a day.

The M. L. Macauley Company, Inc., 30 East 42nd Street, New York City, are selling agents of the entire product.

Katzenstein & Keene, Inc., importers of and dealers in paper manufacturers' supplies, have moved from 63 Park Row, New York, to the Fifth Avenue Building, 200 Fifth Avenue, New York.

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Easy Bleaching Sulphite
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"Hurum"
"Bamble"
Extra Strong Kraft; Bleached and Bleachable Sulphate
"Edsvalla" 50% Moist
"Dejefors" Dry
White Spruce
Ground Wood

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EASY BLEACHING
SULPHITE

Wood Pulp

The price tone of imported wood pulp is firm to an extreme. Since the settlement of the strike in the pulp mills of Sweden early in April there has been a stiffening trend in prices and quotations are now at the top levels reached as a result of the market conditions created by the lockout and the consequent loss of production in the Swedish plants. Importers are exhibiting a very firm attitude and are holding such supplies of pulp as they have unsold at full quoted figures; moreover, manufacturers in Scandinavia are offering in limited tonnage and the tendency of prices is upward.

The strong technical position of wood pulp is based on two cardinal factors. The first is the loss of a tremendous production—variously estimated at from 175,000 to 250,000 tons—because of the shutdown of mills in Sweden for about three months, and the second is the increasing demand that has developed in all consuming countries for chemical pulp. American paper manufacturers have been looking anxiously to Sweden for supplies, British buyers have absorbed pulp freely in the Scandinavian country, while French, Italian and other consumers also have been buying on a comparatively active scale in Sweden. The result is that Swedish producers are well sold up; latest cable reports indicate that they have contracts for more than half of their entire output in 1923 of both sulphite and kraft pulp.

Naturally owing to the lockout and the great loss of production, the Swedes have been obliged to cancel a part of the contracts they had booked from American paper mills prior to the development of the labor difficulty in the pulp and lumber industry. It is stated, however, that the manufacturers in Sweden have been satisfactorily fair in their cancellations; that most mills have cancelled only from one-twelfth to one-sixth of the pulp they had accepted contracts for. Indications are that it will require some time for the Swedish producers to catch up with their shipments as reports say stocks of pulp in Sweden have been greatly diminished.

That pulp continued to come into the United States in record-breaking quantity prior to the shutdown in the industry in Sweden is shown by Government statistics of importations in December last. During the last month of 1922, imports of chemical pulp into this country reached a total of 154,347 net tons of all grades, which doubtless establishes a new high record of pulp importations into the U. S. December imports, compared with 126,829 net tons imported in November, which in turn was the largest month's importations in any month in 1922 up to December; with 109,346 net tons imported in October, and with 117,059 net tons in December, 1921. December imports brought the total for all of 1922 up to 1,030,857 net tons, an average monthly of 85,904 net tons, and representing the largest amount of pulp ever before imported in the United States in a single year.

Imports of ground wood in December last were 30,447 net tons, bringing the total for the year up to 215,578 net tons, which also was a record. In fact, the increase in mechanical pulp importations last year was probably relatively greater than in chemical pulp.

Kraft pulp is in a very firm quotable position. Board mills are reported buying this kind of pulp in generous amounts, and it is said that spot stocks of kraft are smaller than any othed description of pulp brought into the country from outside sources in sizeable volume. No. 1 Swedish kraft has sold at 3.35 cents per pound ex dock New York and other American Atlantic ports, and this constitutes about the lowest price now quoted, some import houses asking up to 3.50 cents. Unbleached sulphite is bringing 3.35 to 3.50 cents per pound on the dock for prime sulphite, and easy bleaching is quoted at from 3.50 cents upward. Bleached sulphite of No. 1 grade is quoted at 4.50 to 5 cents ex dock. Foreign ground wood is high in comparison with the domestic product, importers asking $42 to $44 a ton ex dock.

Receipts at the port of New York in April and current market quotations, ex dock New York, follow:

Bleached sulphite, No. 1	$ 4.50- 5.00
Unbleached sulphite, No. 1	3.35- 3.50
Easy bleaching	3.50- 3.75
Mitscherlich unbleached	3.50- 3.75
Kraft	3.35- 3.50
Ground wood, per ton	42.00-44.00

Castle & Overton, 1,023 bls. from Bremen and 1,100 bls. from Hamburg; M. Gottesman & Co., 4,489 bls. from Hamburg, 1,250 bls. from Gothenburg, 706 bls. from Trieste and 4,000 bls. from Sebenico; Lagerloef Trading Co., 2 bls. from Hango; H. Hollesen, 262 bls. from Hamburg and 5,225 bls. from Bremen; American Woodpulp Corp., 925 bls. from Hamburg; J. Andersen & Co., 1,680 bls. from Christiania; B. L. Soberski, 120 bls. from Christiania; Perkins-Goodwin Co., 300 bls. from Christiania; Nilsen, Lyon & Co., 300 bls. from Christiania; Johaneson, Wales & Sparre, 305 bls. from Gothenburg; Poland Paper Co., 3,850 bls. from Greaker and 2,184 bls. from Trieste; United States Lines, 300 bls. from Bremen; Irving Bank-Columbia Trust Co., 7,902 bls. from Hango; Mechanics & Metals National Bank, 1,000 bls. from Greaker; Tidewater Paper Mills Co., 24,928 bls. ground wood from Liverpool, N. S.; Order, 5,500 bls. from Hango.

Paper Stock

Increased amounts of rags featured the imports of paper-making materials other than wood pulp into the United States in April. Large shipments of rag stock were received from various European sources, the bulk of the supply consisting of roofing rags, which felt mills in this country bought actively abroad all last month. Imports of old rope and bagging were about normal, while arrivals of waste paper, principally from British sources, continued moderately large.

Arrivals at the port of New York during April follow:

Old Rope

E. J. Keller Co., 147 bls. from Algiers, and 194 coils and 37 bls. from Copenhagen; Cuban-American Metal Co., 3 coils from Havana; Katzenstein & Keene, 38 bls. from Marseilles and 24 bls. from Naples; Yglesias & Co., 2 bls. from Havana; Maurice O'Meara Co., 43 coils from Antwerp; W. H. Cummings & Sons, 52 coils from Havre; M. Wolfer & Co., 9 bls. from Havana; W. Schall & Co., 55 bls. from Barcelona; Brown Bros. & Co., 523 coils from Bristol, 1,100 coils and 41 bls. from London, 341 coils from Rotterdam, 268 coils from Hull, 56 coils from Christiania and 75 coils from Copenhagen; Ellerman-Wilson S. S. Line, 20 coils from London and 100 coils from Southampton; American Exchange National Bank, 39 coils from Hamburg; International Acceptance Bank, 107 coils from Bremen, 87 coils from Glasgow, 160 coils from Liverpool and 94 coils from Manchester; Irving Bank-Columbia Trust Co., 70 coils from Antwerp; Mechanics & Metals National Bank, 147 bls. from Marseilles; Bemis Bro. Bag Co., 36 bls. from Barcelona; Chemical National Bank, 94 coils from Hamburg; Order, 63 coils from Bristol and 100 coils from London.

Old Bagging

Katzenstein & Keene, 41 bls. from Antwerp and 120 bls. from Leith; E. J. Keller Co., 261 bls. from Havre, 149 bls. from Rouen, 57 bls. from Hamburg and 250 bls. from Antwerp; International Bag Co., 145 bls. from Bristol; E. Salomon Corp., 62 bls. from Rotterdam; American Express Co., 117 bls. from London; Kidder, Peabody Acceptance Corp., 117 bls. from Bremen and 122 bls. from Antwerp; American Exchange National Bank, 32 bls. from Antwerp; Bernard, Judae & Co., 264 bls. from Havre; Equitable Trust Co., 58 bls. from Antwerp and 100 bls. from Rotterdam; Guaranty Trust Co., 161 bls. from Rotterdam; Irving Bank-Columbia Trust Co., 86 bls. from Manchester; E. Butterworth & Co., 157 bls. from Antwerp; Castle & Overton, 54 bls. from Antwerp; C. R. Spence & Co., 109 bls. from Dublin; Kelly & Co., 2 bls. from Dublin; I. Dorfman & Son, 587 bls. from Bristol; L. H. Abenheimer, 189 bls. from Rotterdam; Baring Bros. & Co., 285 bls. from Manchester; New York Trust Co., 114 bls. from Havre; Order, 469 bls. from Bristol.

Rags

Waste Material Trading Corp., 35 bls. from Rotterdam; E. J. Keller Co., 323 bls. from Newcastle, 289 bls. from Antwerp, 305 bls. from Trieste, 47 bls. from Hamburg, 1,247 bls. from Havre, 298 bls. from Belfast, 59 bls. from Marseilles; 125 bls. from Rotterdam and 564 bls. from Copenhagen; Katzenstein

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Pressing table is 33" wide by 46" long.
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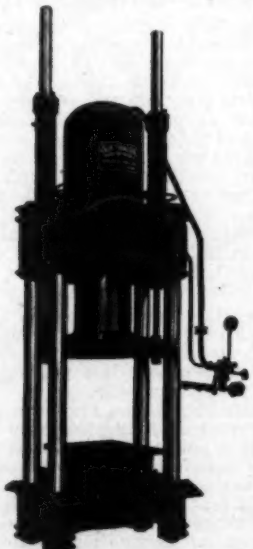
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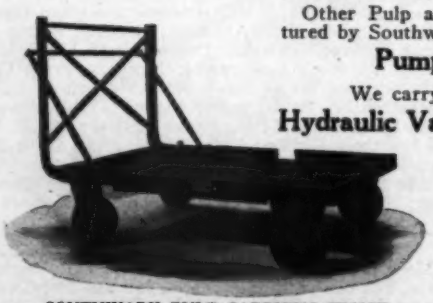
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& Keene, 176 bls. from Antwerp, 67 bls. from Bordeaux, 412 bls. from London and 177 bls. from Havre; E. Salomon Corp., 43 bls. from Rotterdam; G. M. Graves Co., 20 bls. from Rotterdam and 136 bls. from Glasgow; L. H. Abenheimer, 829 bls. from Manchester and 71 bls. from Bristol; Maurice O'Meara Co., 188 bls. from Antwerp, 39 bls. from Hamburg, 106 bls. from London and 125 bls. from Barcelona; Albion Trading Co., 3 bls. from Marseilles and 17 bls. from Rotterdam; J. M. Jaffe, 212 bls. from Hamburg and 4 bls. from Liverpool; Cincinnati Rag & Paper Co., 83 bls. from London; Kelly & Co., 439 bls. from Rotterdam and 10 bls. from Dublin; National City Bank, 970 bls. from Bordeaux, 428 bls. from Antwerp, 69 bls. from Barcelona and 158 bls. from Havre; Cie General Trans, 28 bls. from Bordeaux; International Acceptance Bank, 95 bls. from Hamburg, 41 bls. from London, 105 bls. from Bremen, 194 bls. from Antwerp, 116 bls. from Glasgow and 58 bls. from Havre; New York Trust Co., 265 bls. from Hamburg and 139 bls. from Havre; Irving Bank-Columbia Trust Co., 269 bls. from Antwerp, 155 bls. from Hamburg, 211 bls. from Marseilles 127 bls. from Buenos Aires and 39 bls. from Manchester; Guaranty Trust Co., 194 bls. from Marseilles, 42 bls. from Havre, 1,905 bls. from Antwerp, 8 bls. from Hull and 1,548 bls. from Bordeaux; Mechanics & Metals National Bank, 440 bls. from Belfast, 255 bls. from Antwerp and 50 bls. from London; American Exchange National Bank, 30 bls. from Antwerp and 54 bls. from Havre; Jewish Colonial Trust Co., 691 bls. from London and 428 bls. from Manchester; First National Bank of Boston, 60 bls. from Vancouver, 37 bls. from Marseilles, 25 bls. from Havre and 8 bls. from Bordeaux; W. Schall & Co., 38 bls. from Antwerp and 45 bls. from Bordeaux; Brown Bros. & Co., 269 bls. from Antwerp, 191 bls. from London, 3 bls. from Rotterdam and 187 bls. from Manchester; Ladenburg, Thalmann & Co., 128 bls. from Hamburg; R. F. Downing & Co., 292 bls. from Manchester and 222 bls. from Havre; Kidder, Peabody Acceptance Corp., 32 bls. from Hamburg; Castle & Overton, 15 bls. from Rotterdam and 43 bls. from Bordeaux; Chemical National Bank, 220 bls. from Rotterdam; Stone Bros. & Victor Galaup Co., 241 bls. from Antwerp and 354 bls. from Havre; Bank of America, 52 bls. from Antwerp; American Woodpulp Corp., 53 bls. from Antwerp; S. Birkenstein & Sons, 72 bls. from Antwerp; E. Butterworth & Co., 180 bls. from London; Equitable Trust Co., 49 bls. from Antwerp, 18 bls. from Havre and 96 bls. from Glasgow; National Shawmut Bank of Boston, 54 bls. from Havre and 52 bls. from Bordeaux; P. Berlowitz, 114 bls. from Havre; M. Moran, 35 bls. from Liverpool; Paterson National Bank, 45 bls. from Liverpool; M. Wolfer & Co., 8 bls. from Havana; G. Lotterhand, Inc., 28 bls. from Rotterdam; J. E. Lodge, 20 bls. from Havre; Manufacturers Trust Co., 20 bls. from Hamburg; Order, 167 bls. from Antwerp, 220 bls. from Belfast, 527 bls. from Hamburg, 127 bls. from Marseilles, 16 bls. from Manchester, 1,017 bls. from Liverpool, 599 bls. from London, 453 bls. from Havre, 74 bls. from Glasgow and 7 bls. from Bordeaux.

Miscellaneous Paper Stock

Brown Bros. & Co., 473 bls. from Dublin, 10 bls. from Glasgow, 214 bls. from Bristol and 125 bls. from Liverpool; Katzenstein & Keene, 395 bls. from Genoa and 324 bls. from Rotterdam; E. J. Keller Co., 2,046 bls. from Antwerp, 92 bls. from Dundee and 123 bls. from Hamburg; Prince & Kennedy, 41 bls. from Dublin; Garfield National Bank, 497 bls. from Antwerp; Irving Bank-Columbia Trust Co., 881 bls. from Antwerp, 144 bls. from Leith and 53 bls. from Glasgow; New York Trust Co., 30 bls. from Glasgow and 36 bls. from Antwerp; C. R. Spence & Co., 106 bls. from Glasgow and 208 bls. from Belfast; G. M. Graves Co., 66 bls. from Glasgow; Goldman, Sachs & Co., 244 bls. from Havre; Kidder, Peabody Acceptance Corp., 95 bls. from Havre; Mechanics & Metals National Bank, 183 bls. from Havre and 1,008 bls. from London; Equitable Trust Co., 79 bls. from Dundee, 26 bls. from Antwerp and 10 bls. from Liverpool; International Acceptance Bank, 457 bls. from Hamburg; Andrew & Cook, 32 bls. from Yokohama; Castle & Overton, 123 bls. from Barcelona; Coal & Iron National Bank, 55 bls. from Rotterdam; Chemical National Bank, 220 bls. from Rotterdam; McEwan Bros., 188 bls. from Dublin; E. Eisenberg, 12 bls. from Havana; Order, 242 bls. from Dublin, 2,578 bls. from Antwerp, 336 bls. from Glasgow, 250 bls. from Manchester, 337 bls. from Vancouver, 717 bls. from Havre, 789 bls. from Dundee and 829 bls. from Liverpool.

Paper

Aside from large shipments of wrapping paper—mostly kraft wrapping from Scandinavian and German sources—imports of paper into the United States in April were comparatively light, if the arrivals through the port of New York can be taken as an indication. Imports of print paper fell to a lower level than in quite a long time, less than 6,000 rolls of

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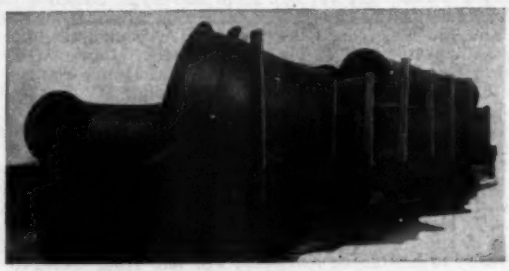

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"Steel for Strength—Wood for Durability"

news print being received at New York during the month. Wrapping paper importations continued far above normal, while usual amounts of cigarette, filter, hanging and other kinds of paper arrived. Receipts of paper of all kinds through the port of New York in April follow:

Cigarette

American Tobacco Co., 1,900 cs. from Bordeaux; P. J. Schweitzer, 15 cs. from Bremen, 94 cs. from Marseilles, 32 cs. from Havre, 78 cs. from Southampton and 36 cs. from Antwerp; Tobacco Products Corp., 4 cs. from Barcelona; Zorro Tobacco Co., 12 cs. from Lisbon; Rose & Frank Co., 12 cs. from Southampton and 141 cs. from Havre; R. J. Reynolds Tobacco Co., 560 cs. from St. Nazaire; De Manduit Paper Corp., 480 cs. from St. Nazaire; J. C. Murray & Co., 2 cs. from Barcelona; Surbrug Co., 14 cs. from Havre; M. Spiegel Sons & Co., 22 cs. from Genoa; J. J. Morton, 12 cs. from Hamburg; Miguel, Coatas & Miguel, 30 cs. from Barcelona; Order, 20 cs. from Barcelona.

Printing

B. F. Drakenfeld & Co., 47 cs. from Liverpool; C. Steiner, 46 cs. from Bremen; Perry, Ryer & Co., 317 cs. from Glasgow; M. Gottesman & Co., 237 rolls from Gothenburg; Newsprint Paper Corp., 319 rolls from Gothenburg; Redden & Martin, 44 rolls from London; Miller & Wright Paper Co., 2 cs. from Rotterdam; Parsons & Whittemore, 1,547 rolls from Bremen; American Exchange National Bank, 317 rolls from Christiania; Corn Exchange National Bank, 303 rolls from Hamburg; Chemical National Bank, 541 rolls from Hamburg and 232 rolls from Rotterdam; Globe Shipping Co., 27 cs. from Bremen; Paper House of Pennsylvania, 52 cs. from Antwerp; H. Reeve Angel & Co., 956 rolls from Bremen; Oxford University Press, 5 cs. from Liverpool; Order, 637 rolls from Bremen and 278 rolls from Hamburg.

Wrapping

Irving Bank-Columbia Trust Co., 74 bls. from Antwerp and 1,057 bls. from Hamburg; C. Huth & Co., 2 rolls from Antwerp; Ladenburg, Thalmann & Co., 2,160 rolls and 1,063 bls. from Hamburg and 595 bls. from Trieste; E. Dietzgen & Co., 15 cs. from Hamburg; International Acceptance Bank, 128 bls. from Trondhjem, 68 rolls and 6,322 bls. from Hamburg, and 58 rolls and 294 bls. from Buviken; Equitable Trust Co., 327 rolls and 154 bls. from Trondhjem, 1,337 rolls and 1,017 bls. from Hamburg, 325 rolls and 215 bls. from Buviken and 126 bls. from Copenhagen; Fernstrom Paper Co., 3 rolls from Trondhjem, 1,797 rolls from Hamburg and 3 rolls and 24 bls. from Gothenburg; Blauvelt-Wiley Paper Mfg. Co., 114 bls. from Glasgow and 20 rolls from Hamburg; D. S. Walton & Co., 987 rolls and 1,938 bls. from Hamburg and 5 bls. from Gothenburg; American Exchange National Bank, 20 bls. from Hamburg; Public National Bank, 4,201 rolls and 7,874 bls. from Hamburg; Bernard, Judae & Co., 3 cs. from Southampton; Munroe & Co., 2,693 rolls from Hamburg; Chase National Bank, 11 bls. from Hamburg; Chemical National Bank, 1,591 rolls and 63 bls. from Gothenburg and 1,081 rolls and 24 bls. from Hamburg; Wilkinson Bros. & Co., 1,548 rolls and 232 bls. from Gothenburg; F. A. Munsey & Co., 202 bls. and 82 rolls from Gothenburg; C. K. MacAlpine & Co., 590 rolls and 166 bls. from Gothenburg; J. P. Heffernan Paper Co., 493 bls. from Gothenburg; A. E. McAdam & Co., 26 bls. from Gothenburg; Peoples Trust Co., 1,143 rolls and 9 bls. from Gothenburg; Maurice O'Meara Co., 92 rolls and 9 bls. from Gothenburg; Corn Exchange National Bank, 1,392 rolls and 63 bls. from Gothenburg; C. Keferstein, 109 bls. from Hamburg; Epstein, Burstein & Sussman, 176 bls. from Hamburg; Melby, Kuttroff & Co., 22 rolls from Christiania; Guaranty Trust Co., 103 rolls from Hamburg; Birn & Wachenheim, 31 cs. from Rotterdam; Tradesmen's National Bank, 56 bls. from Gothenburg; Order, 3,199 rolls from Rotterdam, 1,638 rolls and 718 bls. from Hamburg, 1,000 bls. from Hango and 16 rolls from Trieste.

Writing

Coenca-Morrison Co., 6 cs. from Havre; E. Dietzgen & Co., 39 cs. from Marseilles; Bernard, Judae & Co., 52 cs. from Havre; Gallagher & Ascher, 3 cs. from Havre; Order, 37 cs. from Antwerp and 105 cs. from Trieste.

Drawing

Keuffel & Esser Co., 103 cs. from Hamburg; E. Dietzgen & Co., 5 cs. from London; R. F. Downing & Co., 30 cs. from Yokohama; Globe Shipping Co., 2 cs. from London; Order, 4 cs. from London.

Filter

E. Fougera & Co., 49 cs. from Southampton; H. Reeve Angel & Co., 31 cs. from London and 11 cs. from Southampton;

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2. *Uniform composition.*
3. *Dependable supply.*

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PRESSURE PIPE THAT NEVER BURSTS.
Built in sizes 1 inch to 48 inches.

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The Pipe of Service

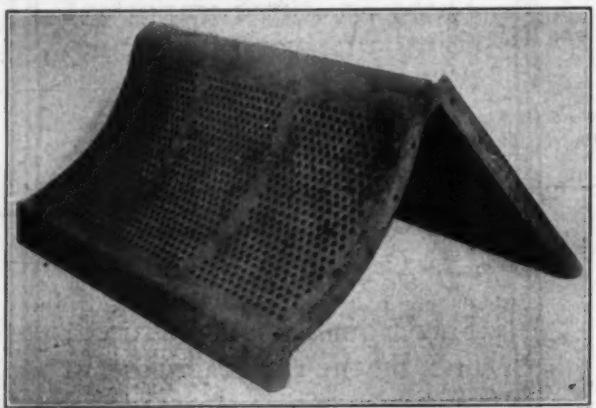
DURABLE—ECONOMICAL—EASY TO INSTALL

Built of selected Canadian White Pine, Wyckoff Wood Pipe is wound with steel bands whose tensile strength is 58,000 to 65,000 lbs. per square inch. The experienced engineer selects a pipe of proven dependability. Wyckoff Wood Pipe, during the past 65 years, has built a reputation that stands the keenest competition. It has been, during this time, the choice of the largest pipe users in the world. We also manufacture a high grade underground steam pipe casing.

Write today for catalog and prices

A. Wyckoff & Son Company

1855 Elmira, N. Y., U. S. A. 1923



Because there are no moving parts this is a very simple but very efficient device. Patent No. 1,271,426 issued to Mr. Brownell Buehler, July 2nd, 1918.

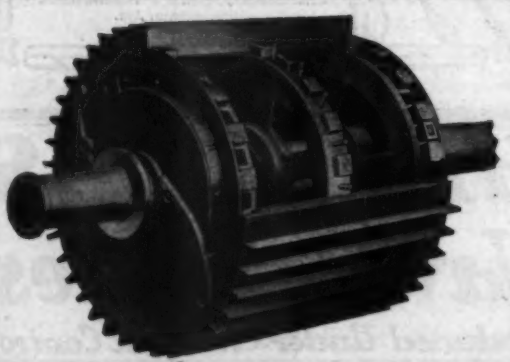
The Shartle Continuous Beater Company

MIDDLETOWN, OHIO

"Dayton" Beating Engines are Built for Heavy Duty

Dayton Beater and Hoist Co.

DAYTON, OHIO



Dayton Globe Iron Works

DAYTON, O.

We manufacture Beating and Washing Engines, Head Gates, Hoists and Gears.

Our Wedge Type Bandless Roll made of semi-steel with special alloy bars is practically indestructible.

Bernard, Judae & Co., 16 cs. from Gothenburg; J. Manheimer, 98 bls. from Southampton and 53 bls. from Havre; Globe Shipping Co., 7 cs. from Hamburg; A. Giese & Sons, 2 bls. from Bordeaux.

Tissue

Iwai & Co., 20 cs. from Kobe; Wyman Shipping Co., 11 cs. from Liverpool; H. Reeve Angel & Co., 24 cs. from Hamburg; F. C. Strype, 11 cs. from Liverpool; Meadows, Wye & Co., 12 cs. from Liverpool; R. Hoe & Co., 5 bls. from London.

Photo

Gevaert Co. of America, 70 cs. from Antwerp; J. J. Gavin & Co., 3 cs. from Liverpool.

Hanging

R. F. Downing & Co., 91 cs. from Yokohama and 6 bls. from London; W. H. S. Lloyd & Co., 116 bls. from London; Meadows, Wye & Co., 6 cs. from London; A. C. Dodman, Jr. & Co., 32 bls. from Liverpool and 6 bls. from Southampton; F. C. Prager & Co., 6 cs. from Antwerp; National City Bank, 1,943 bls. from Bremen; A. Murphy & Co., 7 bls. from Havre, 21 bls. from Hamburg, 19 bls. from Southampton and 2 bls. from Liverpool; Judson Freight Forwarding Co., 7 cs. from Havre; A. H. Ringk & Co., 3 cs. from Bremen; Order, 3 cs. from Antwerp.

Board

Buschmann Bros., 332 rolls from Rotterdam and 298 rolls from Hamburg; International Acceptance Bank, 11 cs. from Hamburg; Coty, Inc., 58 cs. from Havre; Wiebush Calender Importing Co., 30 cs. from Hamburg; Pulp & Paper Trading Co., 426 rolls from Rotterdam; Publicity Paper Corp., 1,200 bls. from Hamburg; Columbia Overseas Corp., 80 cs. from Hamburg; Alpers & Mott, 35 cs. from Bremen; A. Bourjois & Co., 61 cs. from Havre; Happel & McAvoy, 7 cs. from Havre; Bendix Paper Co., 132 cs. from Hamburg; Metropolitan Import & Mfg. Co., 58 cs. from Hamburg; Houbigant, Inc., 3 cs. from Havre; G. M. Thurnauer & Co., 11 cs. from Antwerp; Order, 1,020 bls. from Trieste.

Miscellaneous

Martin & Bechtold, 20 cs. from Bremen; Whiting-Patterson Co., 20 cs. from Havre; A. Flinn & Co., 3 cs. from Havre; T. Patterson Co., 9 cs. from Havre; Paradise Paper Box Co., 11 cs. from Hamburg; T. D. Downing & Co., 27 cs. from Hamburg; Judson Freight Forwarding Co., 36 cs. from Havre; Globe Shipping Co., 5 cs. from Havre; Birn & Wachenheim, 600 bls. from Hamburg and 16 cs. from Antwerp; F. L. Kraemer & Co., 11 cs. from London; H. D. Catty & Co., 3 cs. from Havre; M. G. Lange & Co., 42 cs. from Bremen; Hensel, Bruckman & Lorbacher, 40 bls. from Hamburg; Borden Riley Paper Co., 19 cs. from Antwerp; Parsons Trading Co., 9 cs. from Melbourne; Japan Paper Co., 61 cs. from Yokohama and 20 cs. from Havre; Happel & McAvoy, 24 cs. from Hamburg; S. Langedorf Co., 12 cs. from Hamburg; H. W. Robinson & Co., 3 cs. from Hamburg.

Foreign Trade Opportunities

Additional information regarding the following foreign trade opportunities issued by the Bureau of Foreign and Domestic Commerce of the United States Department of Commerce may be obtained from the Bureau in Washington, D. C., or its branch offices. It is requested that the number of the inquiry be given at all times.

No. 5909—Rosin of good quality, 50 barrels monthly. Cuba. Purchase desired. Quotations f. o. b. American ports. Terms, cash against documents.

No. 5940—Patent roofing materials in small quantities. Azores. Purchase desired. Quotations c. i. f. Azores port. Terms, cash against documents in United States bank.

No. 5963—Paper and cardboard. Baltic Province. Purchase desired. Quotations f. o. b. American port.

No. 5982—Paper bottles or containers for house to house delivery of milk. New Zealand. Purchase and agency desired. Quotations c. i. f. New Zealand port. Terms, cash.

No. 5997—Paper and paper goods. Chile. Purchase and agency desired. Quotations f. o. b. New York.

No. 6017—Casein, as adhesive for industrial purposes. Italy. Purchase and agency desired. Quotations c. i. f. Genoa. Terms, payment against documents.

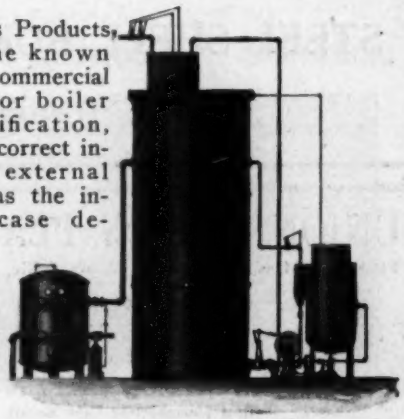
No. 6079—Cards for index filing and novelties in stationery. Spain. Purchase desired. Quotations c. i. f. Spanish port. Terms, cash. Correspondence in Spanish.

No. 6081—Stationery and paper. Canada. Purchase and exclusive agency desired.

No. 6088—Paper and paper products. Hongkong, China. Agency desired. Quotations c. i. f. Chinese port.

Water Softening and Filtration

Paige-Jones Products, include the known successful commercial methods for boiler water purification, permitting correct internal or external treatment as the individual case demands.



Paige - Jones Pressure Filters insure a clean and clear water for all industrial purposes.

Write today for descriptive literature.

PAIGE & JONES CHEMICAL CO.

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248 Fulton St. NEW YORK

NORWOOD FILTERS

Clean Water

Low Maintenance Cost

Reliable

NORWOOD ENGINEERING CO.

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F. W. ROBERTS MANUFACTURING CO.

All Products Guaranteed to Suit You

STEEL SHELL BURRS YELLOW JACKET SHOWER

Read the "ROBERTS IDEA"

UNION SCREEN PLATE CO.

Fitchburg, Mass., U. S. A. Lennoxville, P. Q., Canada

UNION BRONZE SCREEN PLATES

(Best phosphorized Cast Metal)

Old Plates RECLOSED and RECUT to accurate gauge
UNION BRONZE SCREWS for Screen Plates
Immediate Delivery of the Largest Orders. Satisfaction Guaranteed

The Witham Screen Plate Fastener, Patented

THE ORIGINAL THE BEST

Remember

WM. A. HARDY & SONS

FITCHBURG, MASS.

Originators and Oldest Manufacturers
OF THE
Cast Bronze Screen Plate

ALSO SPECIALIZE IN
Acid Resisting Digester Parts

PERFORATED METAL SCREENS

in all metals for pulp and paper mills
Elevator Buckets (Plain and Perforated)
Conveyor Flights and Trough
General Sheet and Light Structural Work
Light and Heavy Steel Plate Construction
Write for perforated metal handbook

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SCREEN PLATES *and* DANDY ROLLS

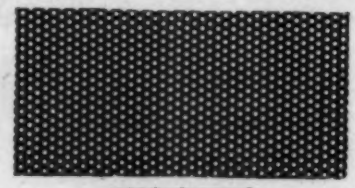
Watermarking a Specialty

Central Manufacturing Co.

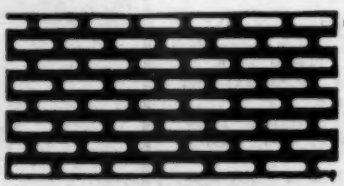
The Quick Service House

KALAMAZOO MICHIGAN

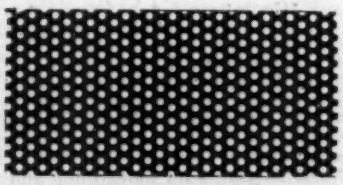
Perforated Metal Screens for Pulp and Paper Mills



.065 inch round



1/8 x 3/4" Slots



3/32 inch round

Steel, Copper, Brass, Bronze and other alloys punched for Centrifugal and Rotary Screens, Pulp Washers, Drainer Bottoms, Filter Plates, etc.

CHARLES MUNDT & SONS 57-65 Fairmount Avenue, Jersey City, N. J.

Personals

Frank Grubb, president of the Merchants Importing Company, of 320 Broadway, New York, representing the Marathon Paper Mills Company, of Rothschild, Wis., retired from active business in the paper trade on May 1 after having been in the paper business for more than 50 years. In the future the interests of the Marathon Paper Mills Company in New York and vicinity will be in charge of their sales manager, J. R. Russell, of 1126 Conway Building, Chicago, who will look after the company's sales in the East as well as in the West.

Gerhard Kjelstrup, formerly with the Craig-Becker Company, Inc., of New York, which firm is being liquidated, is now in business for himself under his own name, importing and dealing in foreign and domestic wood pulp of all grades. Mr. Kjelstrup has opened offices in the National City Bank Building, Madison Avenue and Forty-second Street, New York.

Dr. Francis G. Rawling, Luke, Md., has joined the section of pulp and paper at the United States Forest Products Laboratory. He will assist with the alkaline pulping process investigations and numerous other problems. Dr. Rawling was formerly with the West Virginia Pulp and Paper Co.

Mr. Harold H. Perry, manager's assistant of the Industrial Works, Bay City, Mich., sails for England on April 28. While abroad, Mr. Perry intends to make an extensive study of locomotive and wrecking cranes as used in England.

W. G. Carey, Jr., formerly with the Craig-Becker Company, Inc., wood pulp importers and dealers of 52 Vanderbilt Avenue, New York, is now with the Philadelphia Paper Manufacturing Company, of Manayunk, Pa.

Hal F. Lee, formerly associate editor of the Paper Trade Journal, is now with Gerofsky Bros., Inc., large packers of papermaking rags of 19 Bond Street, New York, acting as office manager of that concern.

James Donald McLaurin has resigned as sales manager of the Liberty Paper Company, New York, after having been connected with that company for seven years.

Frank D. Haskell

Frank D. Haskell, western representative of the American Wood Pulp Corporation, died April 15. At the time of his death he was 70 years of age. He is survived by a widow and two daughters.

The Scandinavian Pulp Agency, Inc., has been organized under the laws of New York State and has established offices at 50 East Forty-second Street, New York, to engage in importing wood pulp, acting as selling agent for a number of large pulp mills in Sweden. The mills the company will represent include the Uddeholm, Wifsta Warf, Stora, Utansjo and the Wermbohl, the combined output of which totals about 185,000 tons annually. John Aspegren is president of the corporation, J. A. Miler vice-president and general manager, and B. Lindell secretary. The company will maintain a branch office in Stockholm, Sweden, in charge of Knut Lundahl.

The Craig-Becker Company, Inc., of 52 Vanderbilt Avenue, New York, is being dissolved after having occupied a prominent position in the wood pulp trade for a good many years. It is understood that H. G. Craig & Co., of the same address, with which the Craig-Becker Company, Inc., was affiliated, will in the future handle wood pulp in a small way.

Galante Bros., dealers in papermaking rags of 58 Greene Street, New York, have incorporated their business under New York State laws with a capital stock of $20,000. A. Galante, J. B. Galante and P. F. Frabbito were the incorporators.

Offices of the Invincible Pulp and Paper Company have been moved from 135 Broadway to the Madison Avenue Building, 342 Madison Avenue, New York.

The Kennelly Paper Company, Inc., has moved to 501 Fifth Avenue, New York City.

The Chicago Mill and Lumber Company has moved its offices to 510 North Dearborn Street, Chicago.

TAYLOR'S SPIRAL RIVETED PRESSURE PIPE

For many years the preferred piping in Paper and Pulp Mills

LIGHT STRONG DURABLE

Sheet Steel Fittings Made to Individual Requirements

AMERICAN SPIRAL PIPE WORKS
P. O. BOX 485 CHICAGO

Guaranteed Perfect

Draper Hollow Balanced Brass Balls

FOR STUFF PUMPS

Absolutely balanced; will not pound out of shape

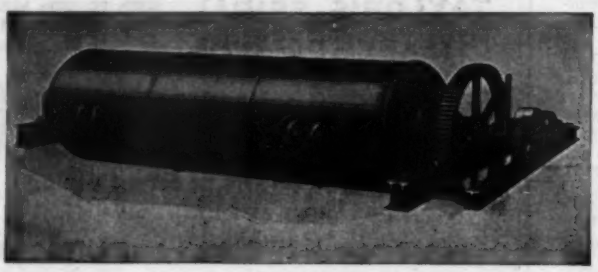
Specify these when ordering new pumps.

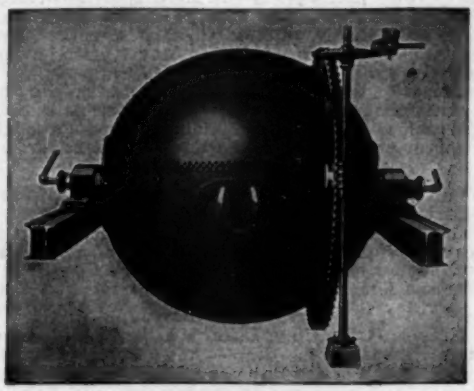
Order these to replace worn-out balls.

We make a specialty of repairing stuff pump balls.

We also manufacture—
SOLID BRASS BALLS
IRON AND STEEL BALLS
BALL CHECK VALVES
VALVE FACING TOOLS

The Draper Manufacturing Co.
Port Huron, Mich. Petrolea, Canada
Every ball bears our registered trade-mark





Biggs Margin of Safety

BIGGS CYLINDER and Globe Rotary Bleaching Boilers are made to withstand working pressures greatly in excess of those required in every-day service. They have ample margin of safety to resist chemical action and corrosion from lime, soda ash, etc. Biggs equipment in practically every important paper plant in the country; repeat orders for "Biggs" again and again whenever new Rotary Boilers are needed; doesn't that suggest merit that's worth your while to investigate? Many installations have been in constant service for over twenty-five years with practically no expense for upkeep.

The Biggs Boiler Works Co. Akron Ohio

"Biggs Rotaries" cover the whole range of paper mill output. Profit by Biggs' long experience studying and solving paper plant engineering problems. Full particulars gladly mailed at your request.

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Seneca Place and Case Avenue Akron, Ohio

30-inch Millspaugh Suction Couch Roll with New Design of Bearings

Fast-Running Newsprint Machines
Fourdrinier Machines for Fine Papers
Cylinder Machines for Board
Plunger type Stock Pumps
Fan and Centrifugal Pumps for General Mill Service
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Granite Press Rolls
Pope Paper Reels
Roll Grinding

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(M-119)